CHNOLOGY DEPT

August, 1946

THE FOUNDRY

wherever metals are cast...

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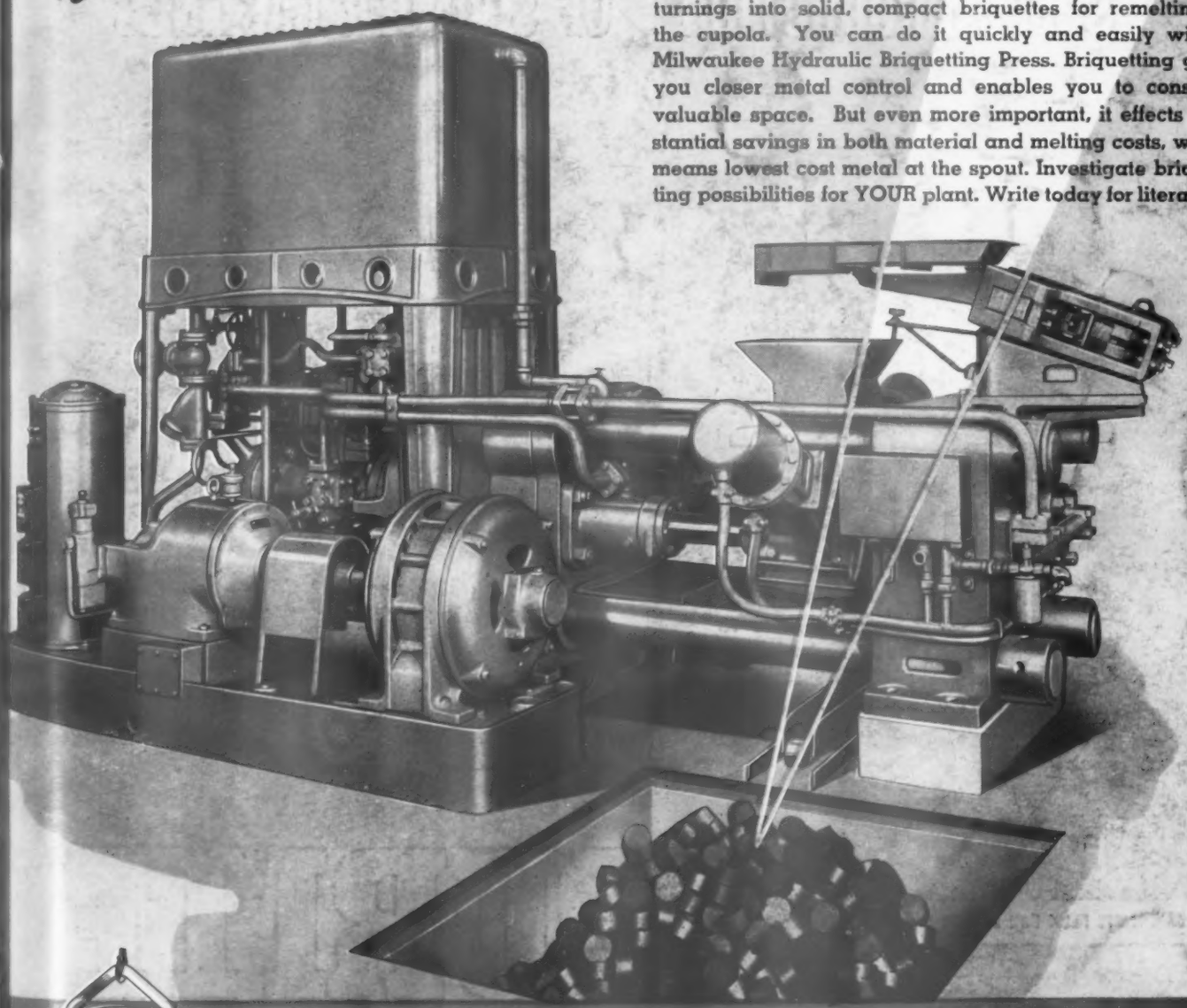
DETROIT

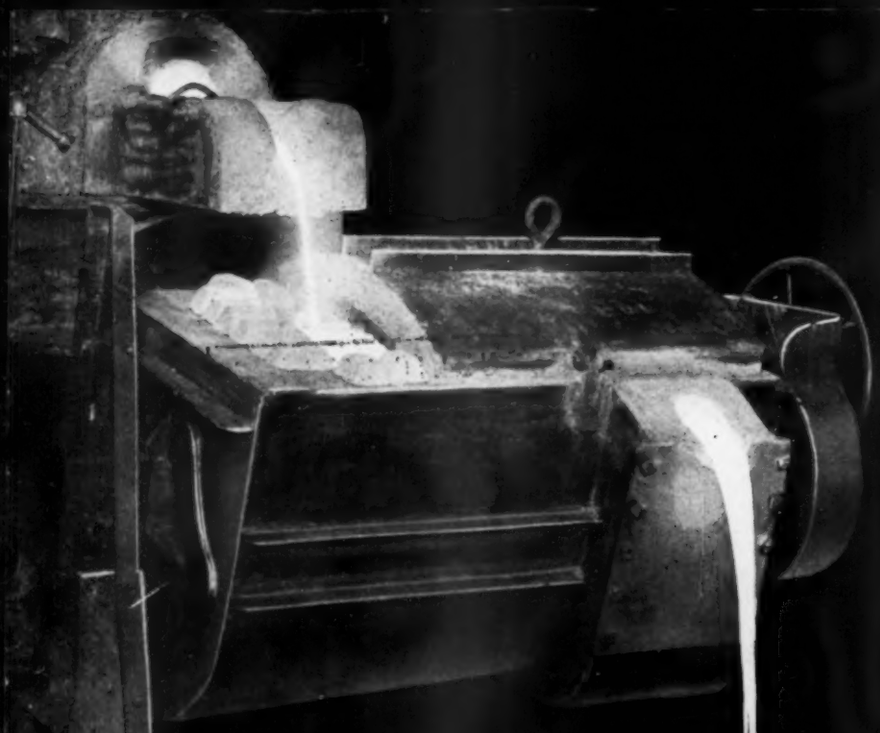
BRIQUETTE... *to conserve resources*

It pays to convert bulky, space-consuming borings and turnings into solid, compact briquettes for remelting in the cupola. You can do it quickly and easily with a Milwaukee Hydraulic Briquetting Press. Briquetting gives you closer metal control and enables you to conserve valuable space. But even more important, it effects substantial savings in both material and melting costs, which means lowest cost metal at the spout. Investigate briquetting possibilities for YOUR plant. Write today for literature.



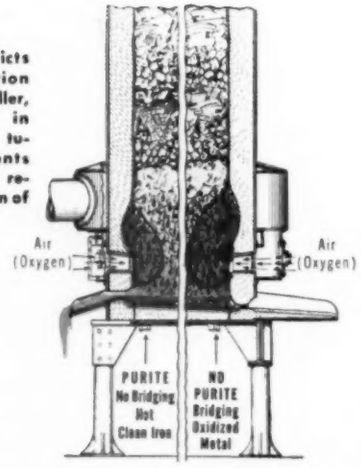
MILWAUKEE *Foundry Equipment Co.*

3238 W. PIERCE STREET, MILWAUKEE 4, WISCONSIN, U.S.A.



SPEED PRODUCTION OF SOUNDER CASTINGS

PURITE restricts the combustion zone to a smaller, hotter area in front of the tuyeres, prevents bridging and reduces oxidation of the metal.



Purite is used with limestone in the ratio of 1 part Purite to 10 parts stone on the bed coke and 1 part to 20–40 parts stone on regular coke charges.

To insure sounder, better machining castings, use Purite

Refining with Purite, whether in the cupola or in a mixer ladle, purges the molten metal of oxides and silicates which produce sluggish iron, shrinkage and segregation defects.

Purite pays dividends in better cupola operations and cleaner stronger castings.

Can you afford to overlook this means of improving your competitive position in the castings industry.

THE SCIENTIFIC FLUX FOR BETTER MELTING AND CLEANER IRON

PURITE

THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42nd STREET, NEW YORK 17, N. Y.
(Licensee of Metallurgical Development Company, Inc.)

In Canada: Railway & Power Engineering Corporation, Limited

TECHNOLOGY DEPT.

Mighty Good Service

...for a mighty long time

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AUG 1 - 194
DETROIT

Chances are, you take your wire rope pretty much for granted.

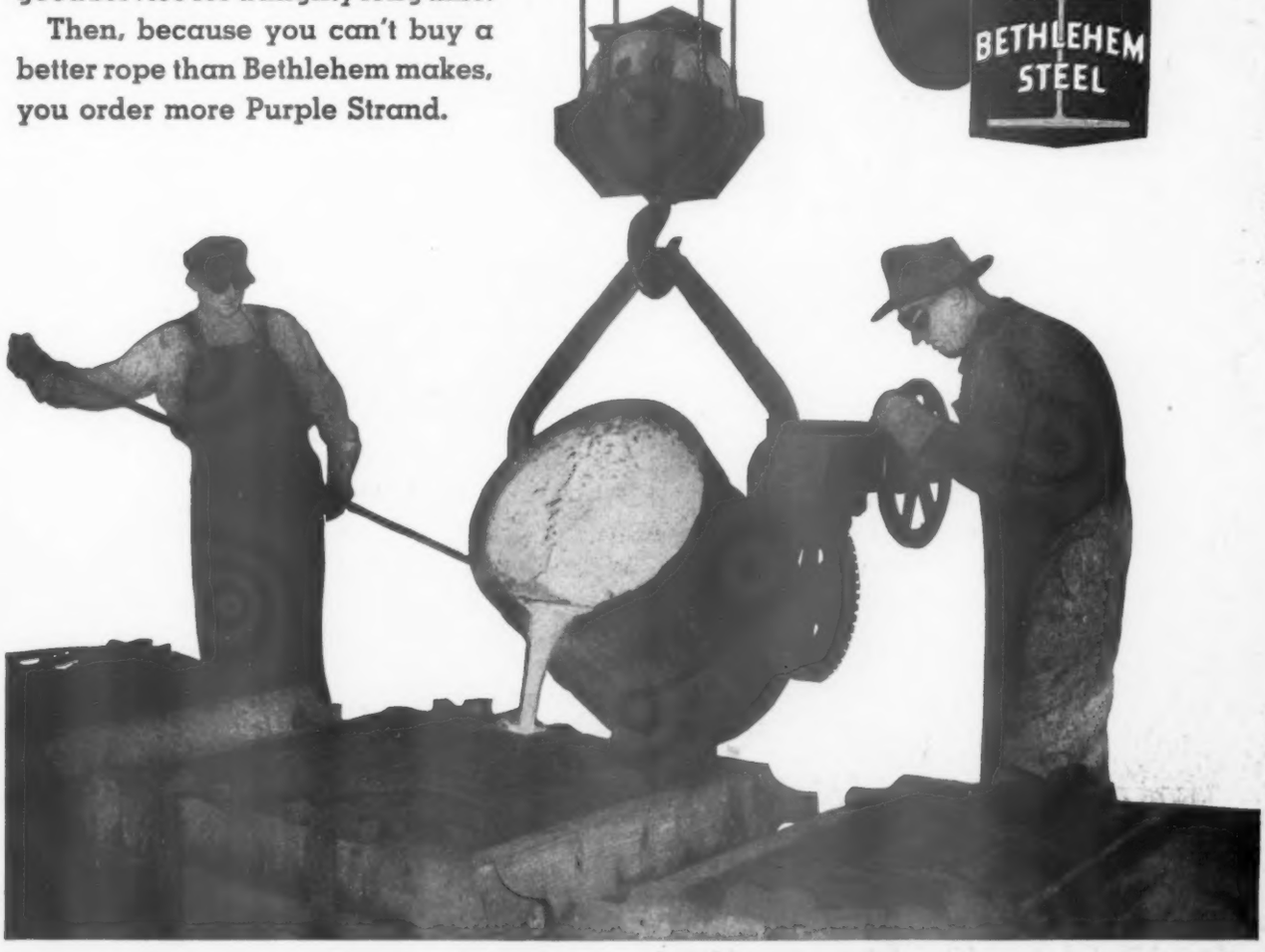
Like your arm, it's always there.

But one day, when you go to re-rig your traveling crane or air hoist, maybe you get to figuring.

"When did I put this Purple Strand rope on the job?" you ask yourself. You check with the records. And you find that the Purple Strand has been giving you mighty good service for a mighty long time.

Then, because you can't buy a better rope than Bethlehem makes, you order more Purple Strand.

It's Bethlehem's best . . . strong . . . trustworthy . . . dependable. Always use it for handling flasks, ladles, castings, and other unusually heavy loads in foundries.



When you think WIRE ROPE . . . think BETHLEHEM

GREEN BOND

A STAR PERFORMER

The Best of the Bentonites

FEDERAL GREEN BOND always assures a permanent, dependable mix. Made from scientifically processed Wyoming bentonite it controls bond strength and can be used to produce a durable, cohesive mold or result in easily collapsing sand that runs freely when required. Specify GREEN BOND on your orders. It's the "BEST OF THE BENTONITES".

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THE FOUNDRY

for AUGUST 1946

VOLUME 74 NUMBER 8

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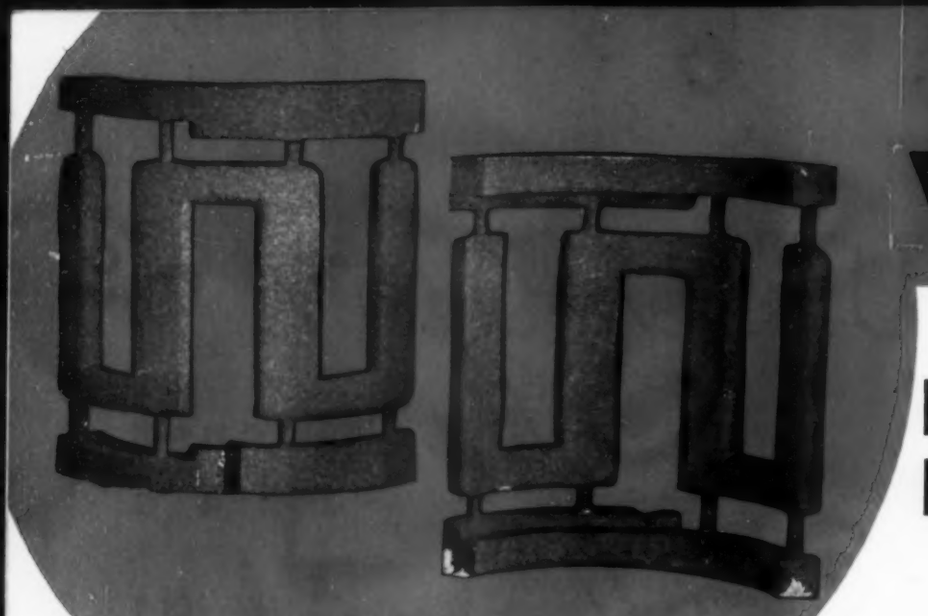


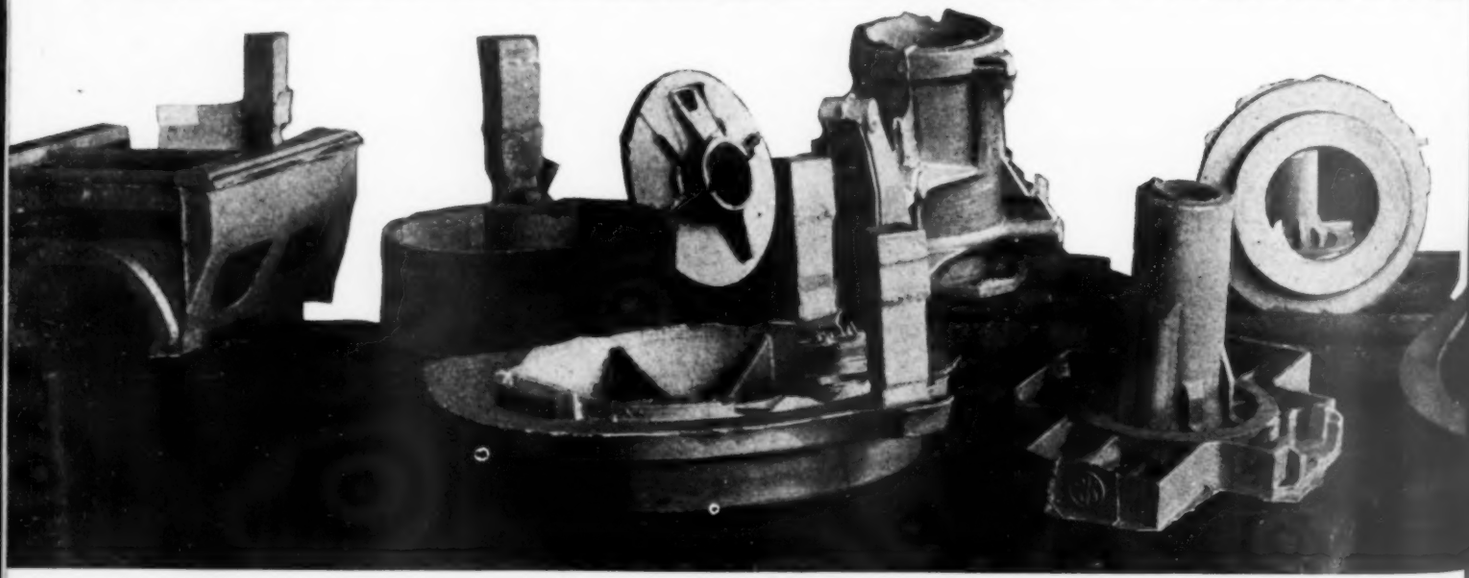
ALL

THE FULTON FOUNDRY & MACHINE COMPANY

CLEVELAND, OHIO

In a big general jobbing foundry like Fulton, Linoil gets a vigorous tryout every day. In one day it runs the whole gauntlet of cores, large, small, intricate, fancy, simple and chunk. It takes a sound oil with a wide latitude of usability for, unlike the production shop, there cannot be a special mix here for each job. Instead of an oven full of identical cores there may be dozens of varieties. All must come out good brown cores, thoroughly dried, none burned, and they must be economically made, and they must produce good castings, not scrap. That is a big order for core oil but Linoil takes it—the margin of safety provided by Linoil makes Linoil truly an all purpose oil. Fulton's castings are meehanite iron.

Warehouses Make Linoil Available



THE WERNER CO.

(DIVISION OF ARCHER-WOODBINE

2191 WEST 110 STREET

PURPOSE

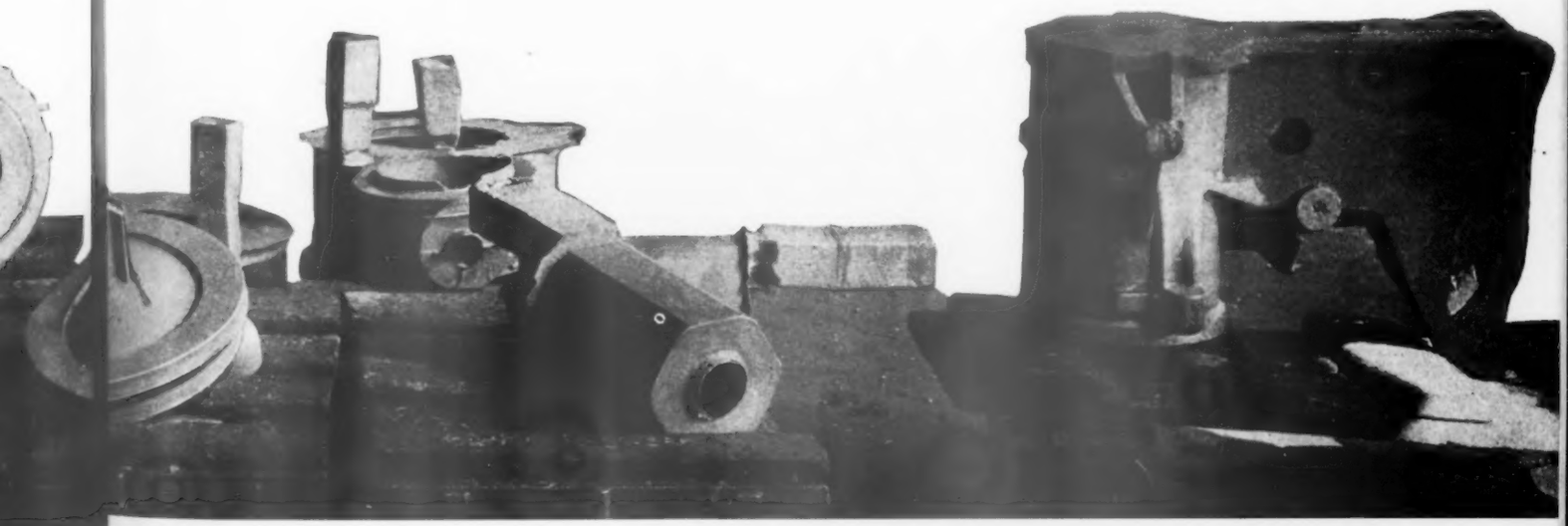
Strength and uniformity permit extreme ratios for production work, and assure safety and economy in general jobbing foundries as an all purpose oil.

LINOIL

Gentlemen: We wish to thank you for the service you have given us recently in connection with the use of Linoil. At the same time we would add that we have used Linoil for more than 20 years. While at times we have experimented with lower grade oil, we have always come back to Linoil for our jobbing cores, because it seems to work more satisfactorily where cores could not be baked immediately and because the assurance factor seemed better for consistently good results when the type and sizes of cores varied widely. Our company relations have been pleasant and we trust these relations will long continue.

The Fulton Foundry & Machine Co.
A. C. Denison, President

Over Night to Most U. S. Foundries



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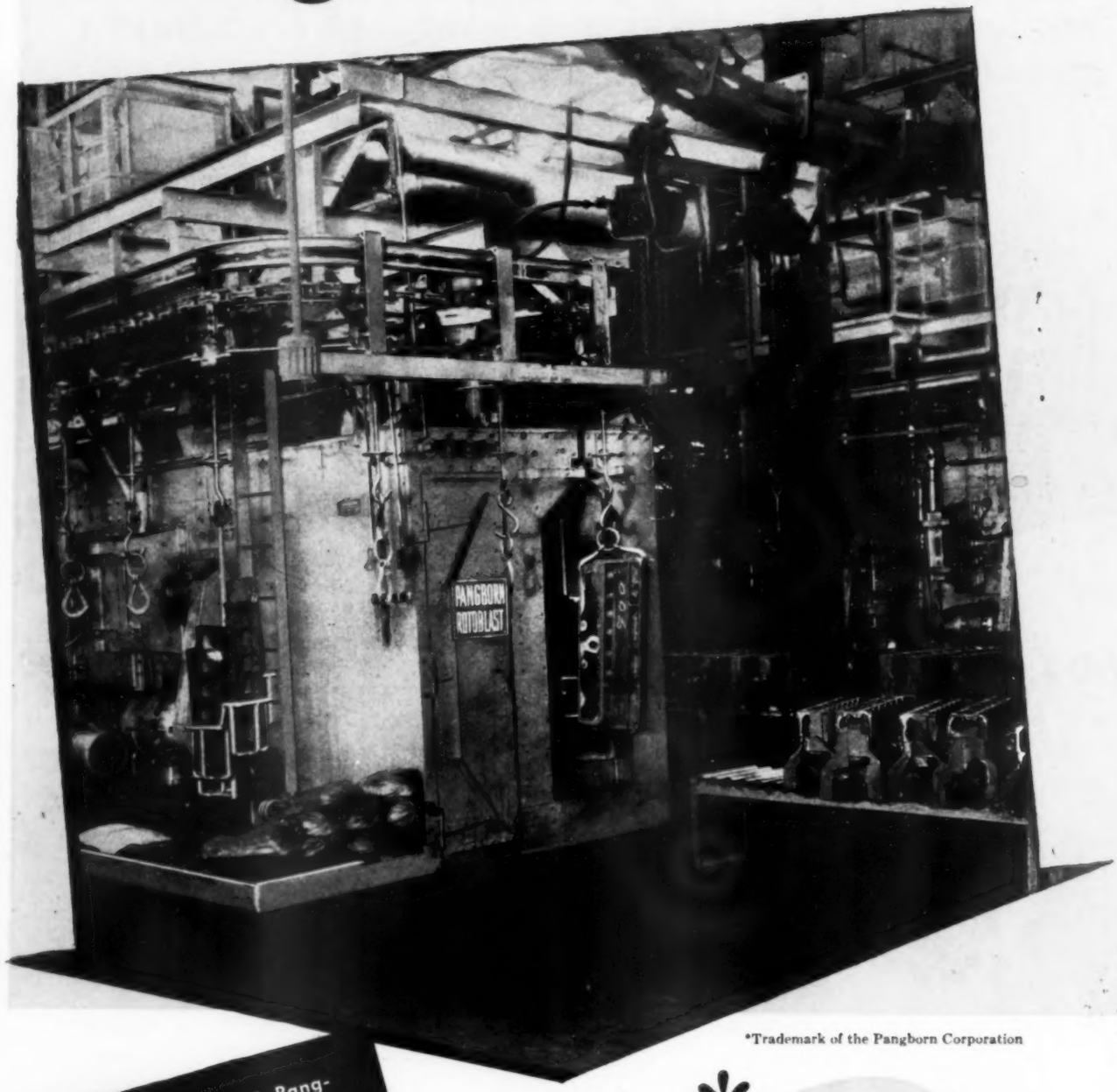
DANIELS - MIDLAND COMPANY)

4690 CLEVELAND 2, OHIO

Largest Order for Airless



Entrance end of Pangborn ROTOBLAST Cylinder Block Cleaning Machine. Indexed conveyor hooks carry work through blasting chamber.

*Trademark of the Pangborn Corporation

ROTOBLAST

*Ro-Ro

HANDLES 600 MOTOR

Blast-Cleaning Equipment Comes to PANGBORN!!

Here's the best proof yet that Pangborn has the *extra value* that production-minded manufacturers always look for.

One of the world's largest automobile manufacturers has used Pangborn ROTOBLAST* equipment for eight years. Now this company—famous for its astute purchasing—has placed with Pangborn the *largest order ever placed for airless blast-cleaning equipment!*

What are the reasons for this preference? *Outstanding engineering.* ROTOBLAST airless blast cleaning utilizes centrifugal force (developed by a rapidly revolving wheel) to do the work—increasing production, improving quality, reducing maintenance, eliminating spoilage, saving on cost of abrasives, facilitating inspection and machining. *High standards of workmanship.* Satisfied customers in 20 automotive plants and more than 1500 other types of manufacturing plants testify to the high quality of ROTOBLAST equipment.

Look to Pangborn for the important new developments in blast cleaning. Come to Pangborn for the equipment selected to fill the largest order ever placed for airless blast cleaning!

For complete information on ROTOBLAST equipment, address Pangborn Corporation, Hagerstown, Maryland, *world's largest manufacturer of blast cleaning and dust control equipment.* Send coupon below.

The Choice on the Largest Order Ever Placed

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

Latest Information on Economical Blast Cleaning

Pangborn Corporation, Hagerstown, Maryland
284-A Pangborn Boulevard

Gentlemen: Please send me free bulletin checked:
ROTOBLAST Barrels, No. 213 ☐ ROTOBLAST Special Machines, No. 2120 ☐ ROTOBLAST Tables, No. 211 ☐
Air Blast Rooms, No. 400 ☐

Name..... Title.....

Company.....

Address.....

o blast

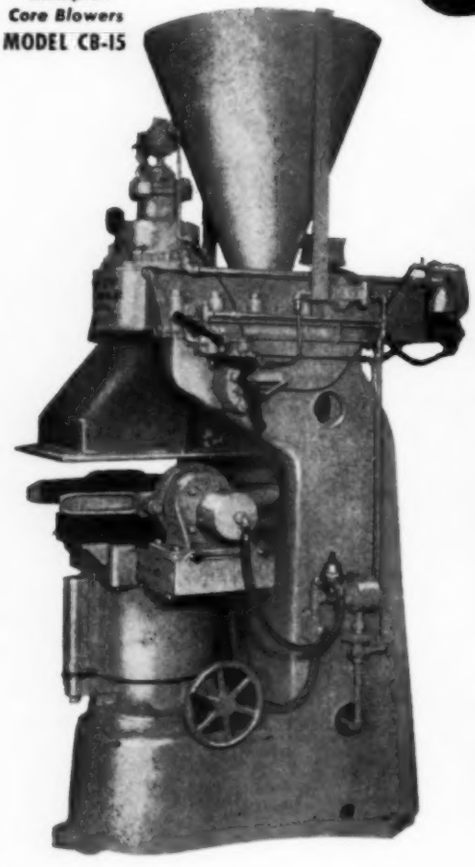
TOR BLOCKS PER HOUR

FOUNDRYMEN from Coast to Coast

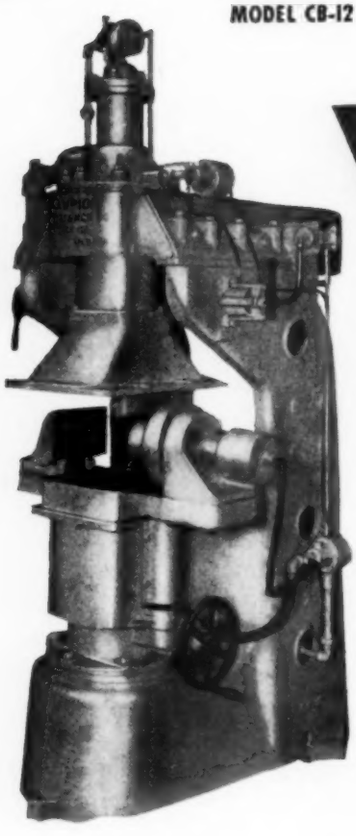
are thrilled by

CHAMPION "Knowhow"

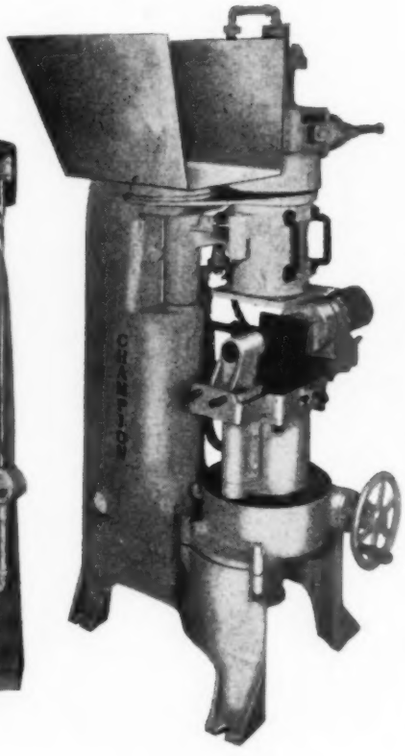
Champion
Core Blowers
MODEL CB-15



Champion
Core Blowers
MODEL CB-12



Champion
Core Blowers
MODEL CB-8

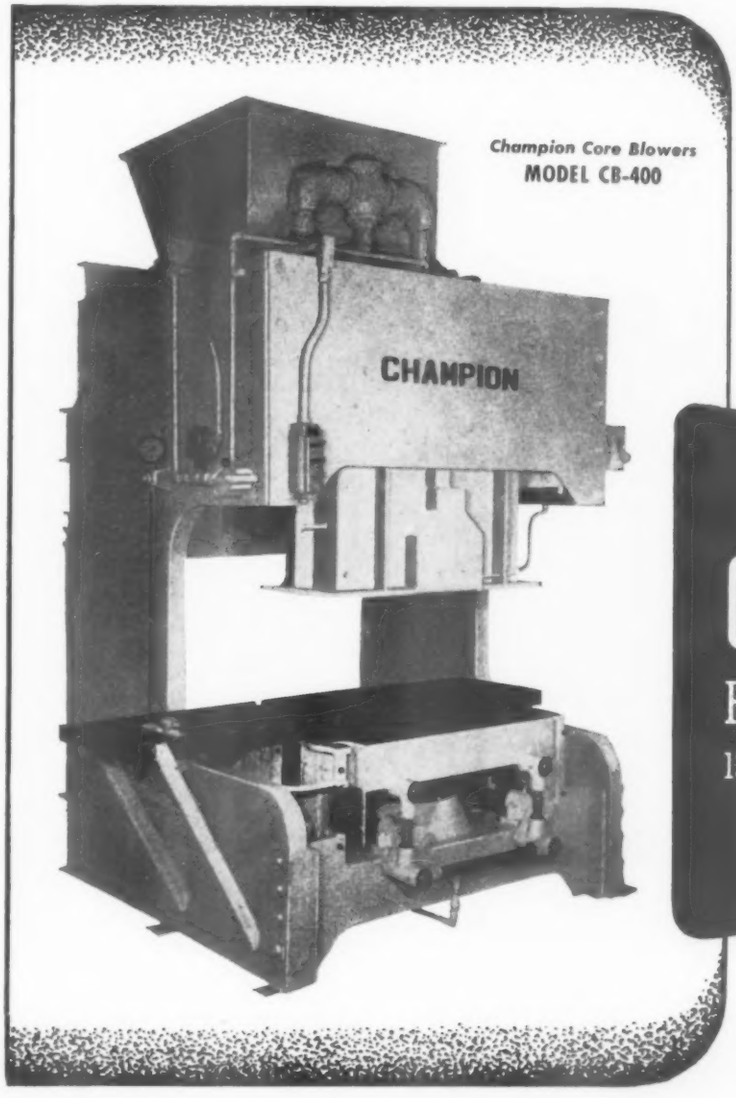


Performance under the stress and strain of today's demand for accelerated production of perfectly rammed cores is the test of a true Champion—a top-notch tool with the "know how" or "savvy" to remove all guesswork.

That is how a Champion Core Blower performs for the least experienced operator. Any man or woman—boy or girl can produce perfectly rammed cores on a Champion Core Blower by merely setting the box and pulling the lever. In a single second small or large cores are perfectly rammed. The working table is completely accessible with no obstructions, so that cores are produced faster, more economically and more accurately without need for highly trained labor.

A single valve operates the core box clamp, clamps same against the blow plate, blows the core, exhausts and releases the clamps in the proper cycle. Rigid one-piece, cast steel frame insures accurate alignment of core box and blow plate. Patented Air-Operated Hydraulic Clamp locks the core box securely against split box separation.

Champion Core Blowers could be the answer to that most puzzling problem of man-power.



Champion Core Blowers
MODEL CB-400

CHAMPION
FOUNDRY & MACHINE CO.
1318 West 21st Street Chicago 8, Illinois

THREE Why IMPORTANT REASONS MORE FOUNDRIES USE DELTA CORE & MOLD WASHES

REASON NO. 1

Delta Core and Mold Washes "Anchor" themselves by penetrating from 3 to 5 grains deep into the sand.

This bond between the wash and the sand... a distinctive DELTA characteristic... produces an expansion-resisting coating essential to the production of finer finished castings.

REASON NO. 2

The hot strength of Delta Core and Mold Washes increases with each degree of temperature rise from 1800°F to 3000°F providing maximum critical hot strength for all foundry applications.

The higher hot strength of DELTA Core and Mold Washes eliminates surface sand fissuring, excessive sand expansion and distortion.

REASON NO. 3

No gas leakage through Delta Core and Mold washed surfaces. Gases produced by decomposition of organic binders in the core sand cannot leak through Delta Core and Mold washed surfaces to contact the molten metal.

Only DELTA Core and Mold Washes provide this unique and all-important insurance against defective castings resulting from gas leakage. DELTA Core and Mold Washes insure more perfect castings with finer finished surfaces.

"For continued excellent production of materials vital to the prosecution of the war" DELTA OIL PRODUCTS CO. has been awarded the ARMY-NAVY "E" for the FOURTH time.

DELTA OIL PRODUCTS CO.

Manufacturers of Foundry Products, Industrial and Automotive Oils, Greases and Compounds

MILWAUKEE 9, WISCONSIN

SAVE
EXTRA HANDLING!

USE CMD *DUAL-PURPOSE CORE TRAYS*

The CMD Dual-Purpose Core Tray can be used for baking the cores, thus eliminating transfer of cores from core plate to core tray.

Because of their lock-stacking features, these trays make possible storage from the floor up. Bins and racks are no longer necessary.

SPECIFICATIONS

SIZE—12" X 24"

LOADING HEIGHT—4½"—6" OR 7"

OVERALL HEIGHT—5½"—7" OR 8"

WEIGHT—9½ POUNDS

MATERIAL—16 GA. SHEET METAL

SPOT WELDED (28 POINTS)

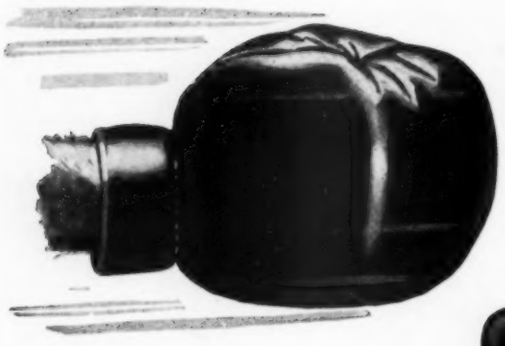
ALL ROUNDED CORNERS

2 BOTTOM REINFORCEMENT ANGLES

CONSTRUCTED FOR STACKING

CHICAGO MANUFACTURING & DISTRIBUTING CO.

Dept. 5F, 1928 West 46th St. CMD Chicago 9, Illinois



PACKS A WALLOP
—but Easy to Hold!

That's why Gardner-Denver T23 Floor Rammers are such big favorites with molders . . . *and foundry operators.* Their powerful ramming action steps up the output per molder . . . reduces spoilage. Comfortable holding characteristics cut down fatigue—allow molder to easily work the rammer over the sand. Power consumption is remarkably low. And all working parts are completely protected against the abrasive action of foundry sand, assuring long life and exceptionally low maintenance costs.

INTEGRAL OIL RESERVOIR *assures complete lubrication.*

CYLINDER BORE SPECIALLY BURNISHED — *highly wear-resistant.*

LOW LIFT END SEATING VALVE *provides efficient piston action over a long period of time.*

TAMPING PAD FIRMLY SECURED *on piston rod by tapered shank and tapered lock nut.*

DESIGNED FOR SIMPLE MAINTENANCE—*piston rod packing and butt attachment arranged for quick and easy access.*

For complete information about the rugged Gardner-Denver T23 Floor Rammer, write Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER

Since 1859

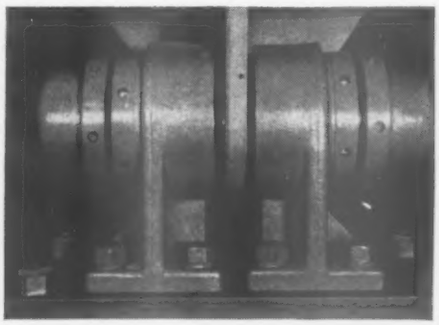
USE COMPRESSED AIR FOR SAFETY CONVENIENCE FLEXIBILITY

NEW "FOUNDROMATIC" SHAKEOUT HANDLES 90% FOUNDRY OUTPUT

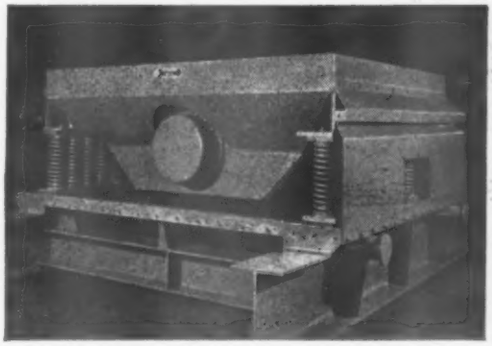
Old way—took 20 minutes with compressed air vibrator, extra man-hours on this 8 ton mold.

New way—Here, a 13½ ton mold is freed in 1 minute, 45 seconds on the modern, high-speed "Foundromatic" shakeout!

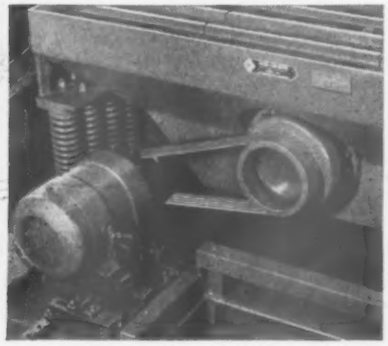
Here's all-welded, stress-relieved deck—built to withstand 24-hour-a-day abuse!



These snubbers stabilize shakeout — assure smoother operation starting and stopping.



20 resilient support springs easily carry weight of shakeout plus entire weight of mold.



Special pivoted type motor base maintains uniform tension on belts.

First Pictures of 25 Ton Capacity, Single Unit Shakeout Reveal Features, Construction Which Promise Important Foundry Benefits

MILWAUKEE, WIS.—A new shakeout has been designed to handle 90% of tonnage cast in average jobbing foundries — where molds daily range anywhere from 500 to 50,000 pounds each. Called the "Foundromatic" shakeout, this new 8 x 10 foot, 2-bearing unit is supplanting smaller, conventional 4-bearing shakeouts for heavy duty applications and wide weight-range operations.

Companion sizes—6 x 8 ft, 18 ton; 5 x 8 ft, 12 ton; 5 x 8 ft, 7½ ton; and 4 x 6 ft, 6 ton capacity units—are available.

Single units, the new shakeouts eliminate need for using multiple, smaller, 4-bearing units to get big capacity. In addition, they're *lower* in initial and operating cost; require *less* maintenance; *save* valuable floor space.

For complete details, contact our nearby district office, or write for Bulletin B6365. ALLIS-CHALMERS, MILWAUKEE.

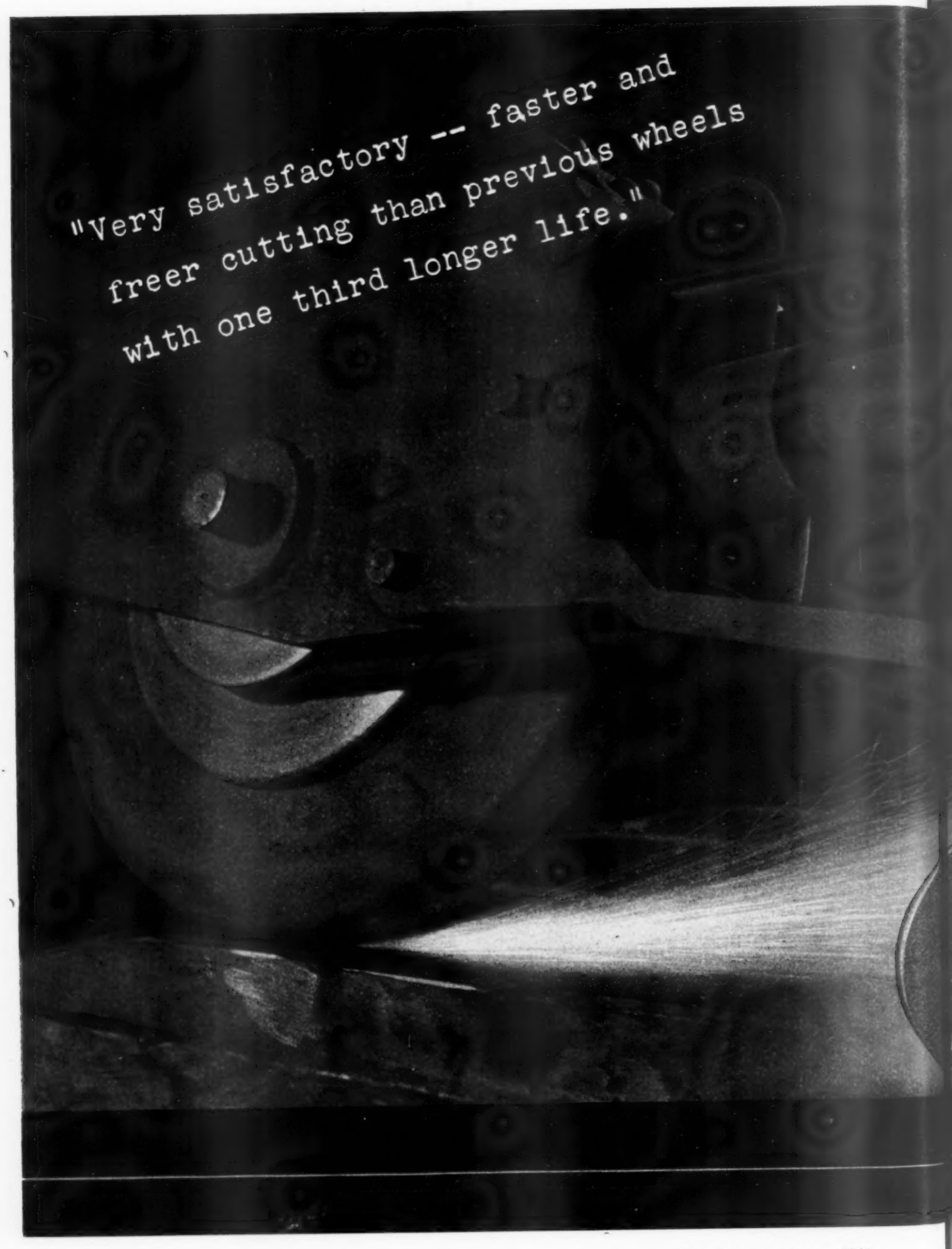
A1965

Get Extra Melts Per Day With "Regulex" Control

Extra melts per day—at lower cost—are possible when arc furnaces are served by A-C complete substations. Largely responsible for gains is "Regulex" electrode control.

This kind of help is typical of A-C equipment for the foundry industry — Screens, Crushers, Hearth Furnaces, Kilns, Motors, Starters, Texrope Drives, Pumps, Blowers, Compressors, Transformers, etc.

ALLIS CHALMERS EQUIPMENT FOR THE FOUNDRY INDUSTRY


"Very satisfactory -- faster and
freer cutting than previous wheels
with one third longer life."

That's What They Are Saying About

NORTON B-5 RESINOID FOUNDRY WHEELS

YES, it's typical of the comments from foundry after foundry where they've tried the new Norton B-5 Resinoid Wheel. On floor stands, swing frame and portable grinders—on steel, malleable iron, gray iron and nonferrous castings B-5 wheels are making outstanding records.

In some foundries they are showing a faster cutting action with the same wheel life; in others they are giving longer life with the same speed of cut; and in still others they are *both* cutting faster and lasting longer.

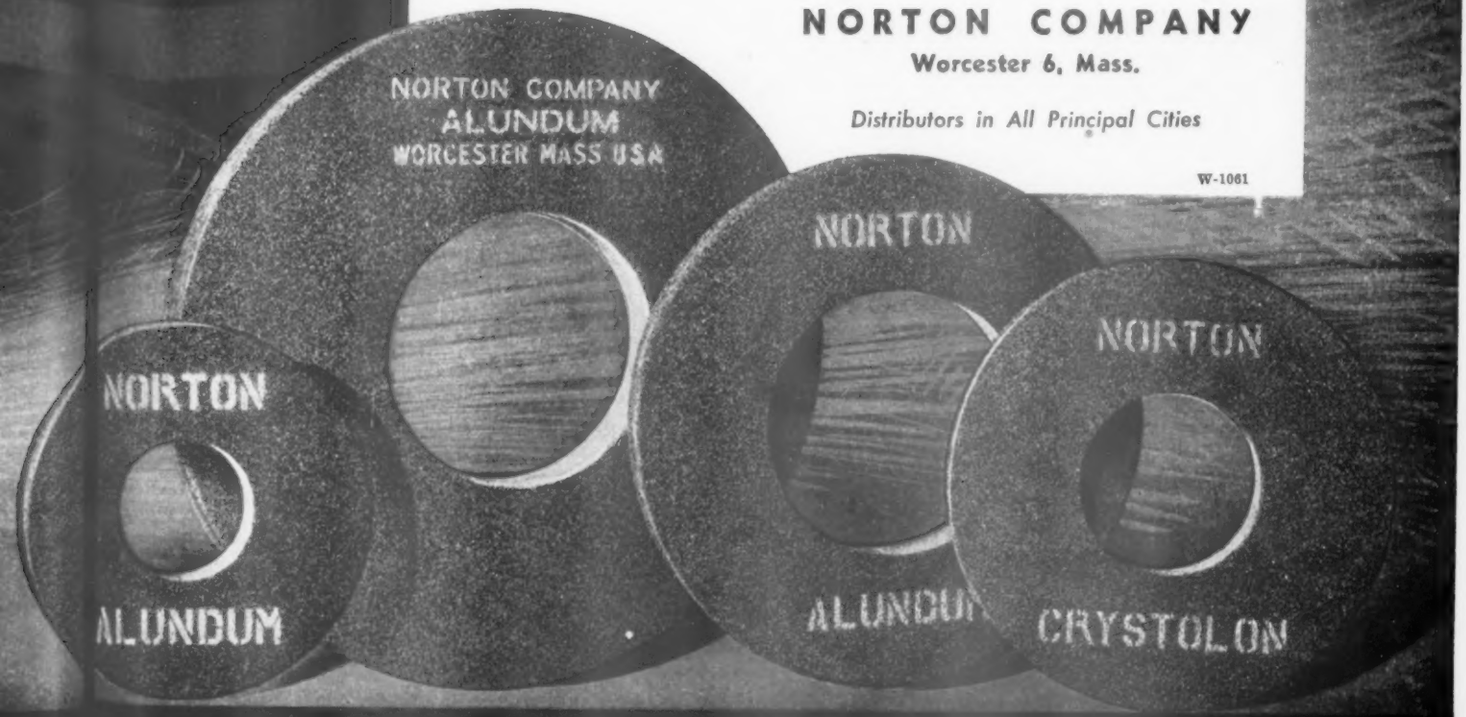
With low production costs so important now it will really pay you to let a Norton engineer or the abrasive specialist of your Norton distributor study all the grinding jobs in your cleaning room and specify the exact B-5 wheels you need.

A new catalog for foundries gives the full story of B-5 resinoid wheels, including suggested specifications, and also tells about other Norton products for the foundry. Write for Form 1405F—no obligation.

NORTON COMPANY
Worcester 6, Mass.

Distributors in All Principal Cities

W-1061

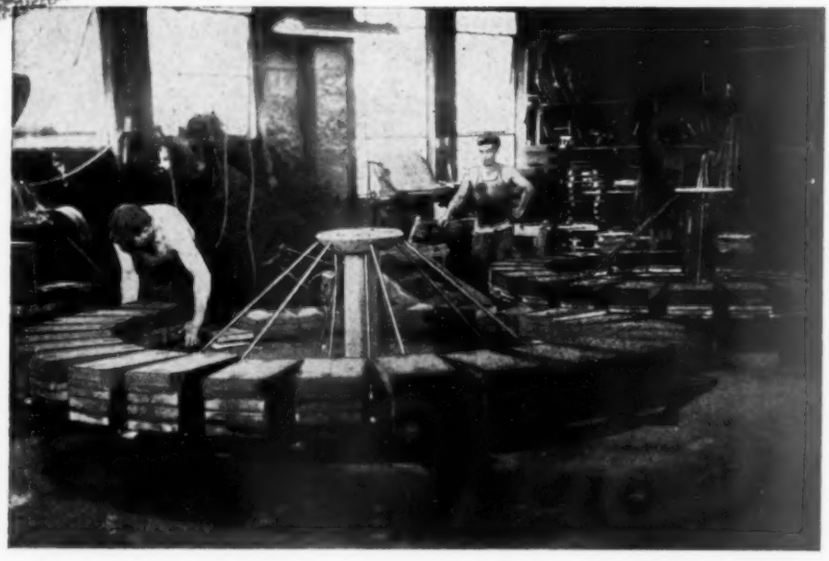


NORTON ABRASIVES

ROTO-CAST

REVOLVING MOLD CONVEYORS

For All Foundries with Melting Facilities for Continuous Pour



Increases mold production . . . saves labor . . . reduces handling time . . . Speeds output . . . Comes ready for quick, easy installation . . . !

★

3 Sizes

ROTO-CAST is made in three standard sizes: 10-ft., 12-ft., and 14-ft. diameters.

Full roller-bearing construction for easy turning. When desired, release of ratchet makes free-wheeling. Can be rotated with one finger even when fully loaded. No motors or other operating cost.

★

* Designed by foundrymen under actual working conditions, ROTO-CAST conveyors are in use in representative foundries . . . have proven their unusual merit and efficiency.

Easy to assemble and install, the unit sets on the floor without the necessity of anchoring, thus giving full flexibility. It is placed just back of each molder who simply turns around, places his mold on the conveyor, then steps on a trip ratchet release . . . spring arrangement revolving ROTO-CAST to position for receiving the next mold.

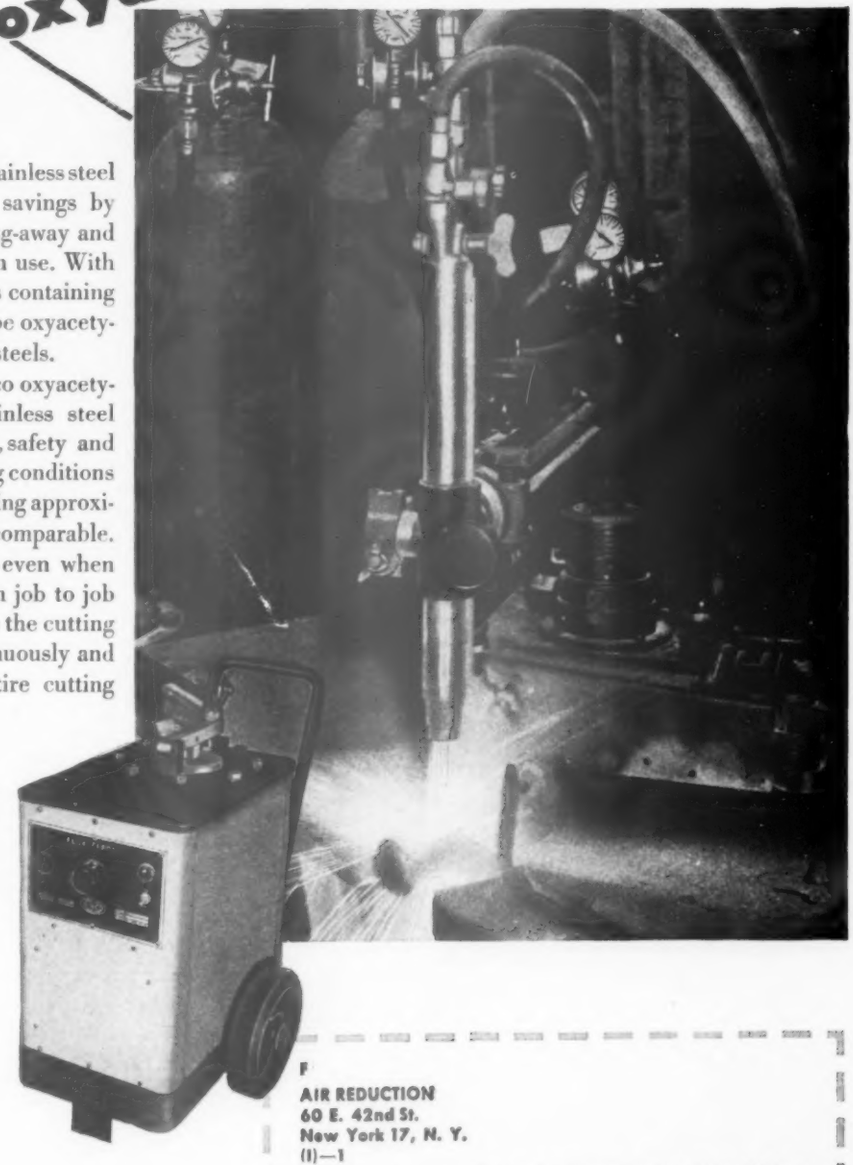
Pouring may be done from one spot as the unit is revolved and stopped positively for the pour. Shake-out is at one spot with molds simply picked off and dumped as machine is revolved. Its low cost will surprise you.

WRITE FOR FOLDER "F" FOR FURTHER DETAILS

ROTO-CAST *Foundry Equipment, Inc.*

COLDWATER, MICHIGAN, U. S. A.

here it is! the answer to stainless steel cutting with the oxyacetylene flame



Airco's new Flux-Injection Method of stainless steel cutting points the way to important savings by eliminating the slow, laborious melting-away and mechanical processes now in common use. With the NEW Airco process, stainless steels containing alloying elements as high as 50% can be oxyacetylene flame cut as readily as ordinary steels.

Designed for use with standard Airco oxyacetylene equipment, this new Airco stainless steel cutting technique keynotes simplicity, safety and economy of operation. In fact, operating conditions and instructions for stainless steel cutting approximate mild steel, and "cut-speed" is comparable.

The Flux Feeder Unit is portable, even when fully charged, so rapid movement from job to job is assured. The Unit feeds the flux into the cutting oxygen stream. Thus, the flux is continuously and evenly dispersed throughout the entire cutting operation.

An explanatory article — "Flux-Injection Method Brings Economies of Oxyacetylene Flame Cutting to Stainless Steels"— will be available shortly. Fill in and mail the coupon for your copy. Air Reduction, General Offices, 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, General Offices, Houston 1, Texas. Represented internationally by Airco Export Corporation.

AIRCO

AIR REDUCTION

Offices in All Principal Cities

ORIGINATORS OF MODERN OXYACETYLENE AND ELECTRIC ARC METHODS FOR METAL FABRICATION

F

AIR REDUCTION
60 E. 42nd St.
New York 17, N. Y.
(I)—1

Please send me a copy of article: "Flux-Injection Method Brings Economies of Oxyacetylene Flame Cutting to Stainless Steels"

Name_____

Firm_____

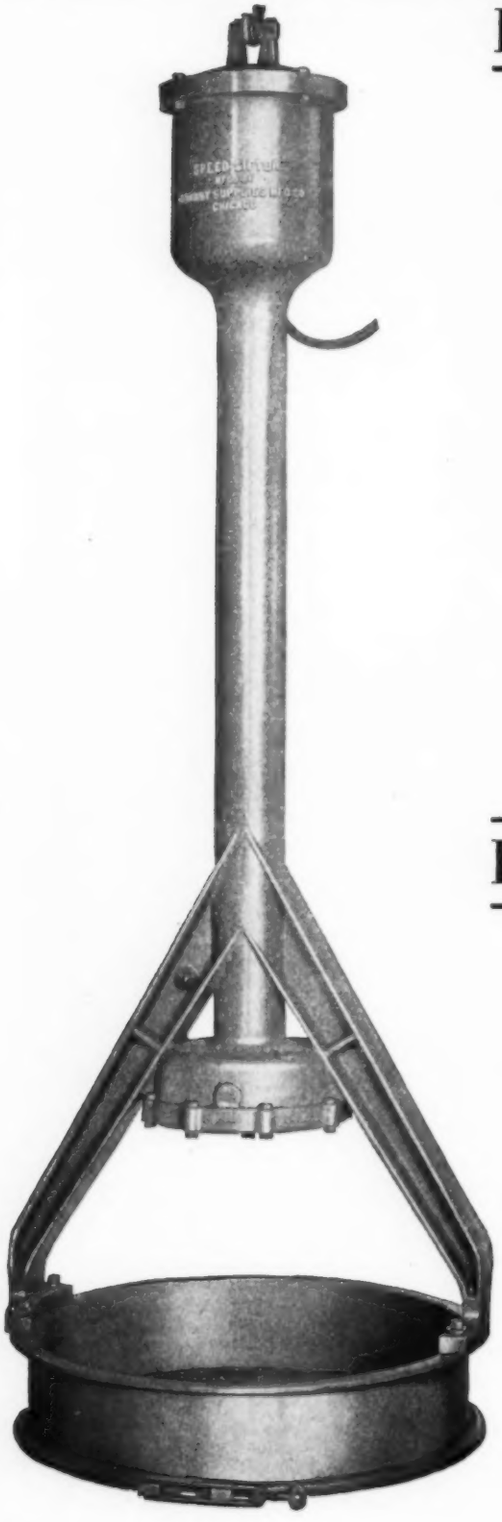
Address_____

City_____ Zone____ State_____

Increase Production

with the

ROTOPLANE SPEED SIFTER ★ RED ELECTRIC VIBRATORS



ROTOPLANE SPEED SIFTER

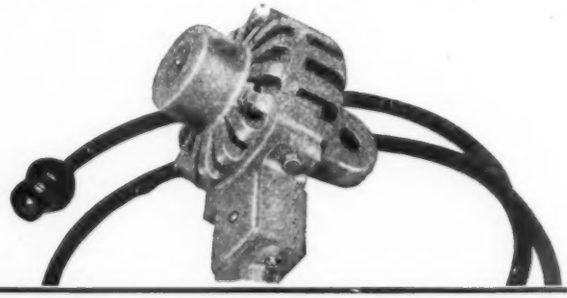
The ROTOPLANE Speed Sifter is an *improved* sand riddle of much greater capacity and much longer life. One size and type serves all purposes in the foundry—does *all* your sifting more quickly and economically.

It is easily handled by one man, weighs approx. 90 lbs., is 62 in. high overall. The one-piece frame of tough aluminum alloy makes for a remarkably effective vibration. Its smooth, free, rotary action vastly increases bearing life; all bearings grease packed. All mechanism of the ROTOPLANE is *completely* enclosed—no bearings or activating parts of any kind exposed to dust and grit.

The Quick-Change Sieves are instantly interchangeable, mounted in smooth, flat steel ferrule, with 20-inch diameter clear sifting area. No jagged edges to tear workers' hands, no storage problem.

$210.00 f. o. b. Chicago — complete with cable, safety ground wire. Standard 1/3 h. p. motor, 110 volt, 60 cycle, single phase.

UNIVERSAL FREE-WHEELING model equipped with motor as above $195.00



RED ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

(All Prices f.o.b. Chicago)

No. 1—Light match plate work	$12.00
No. 2—Medium match plate work	15.60
No. 5—Heavy match plate, tub and bench work	20.40
No. 9—Machine and heavier work	28.80

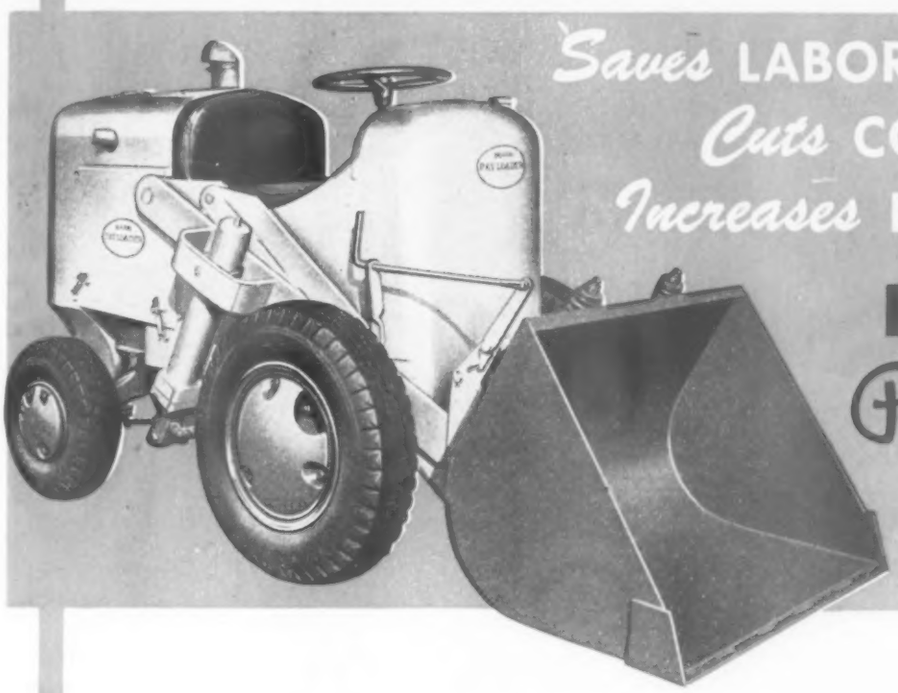
Third (ground) wire per U. S. Govt. code—furnished with No. 9 at no extra cost; $1.20 extra with Nos. 1, 2 and 5 vibrators.

KNEE SWITCHES for operating Red Electric Vibrators: Single pole $3.60, Double pole $4.80.

FOUNDRY SUPPLIES MANUFACTURING CO.

2221 Orchard Street **Chicago, Illinois**

CABLE ADDRESS: "ROTOPLANE CHICAGO"



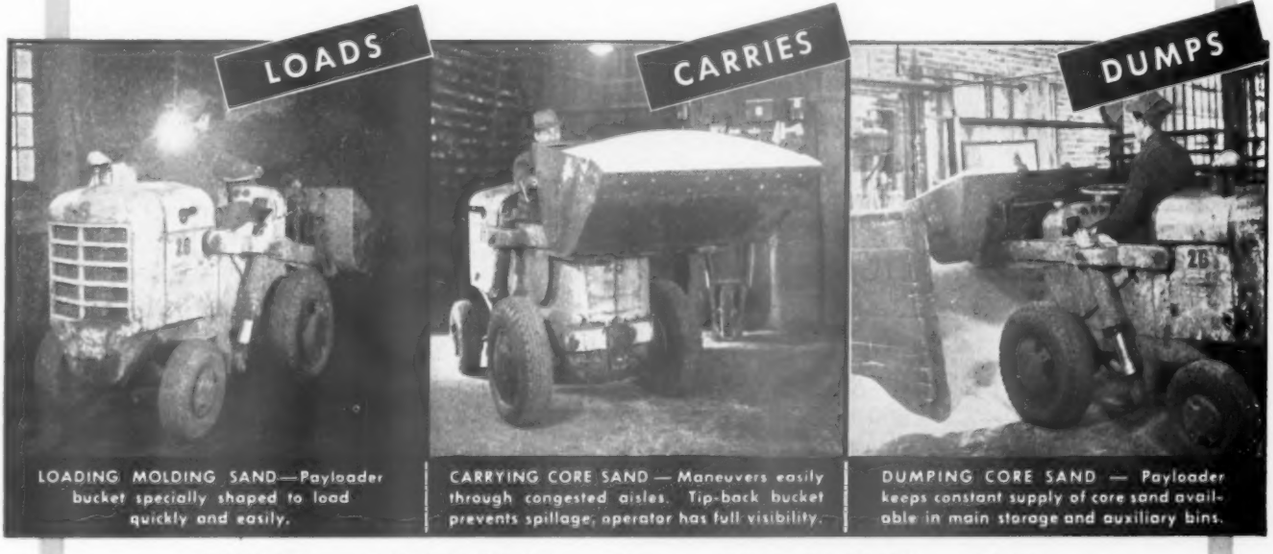
Saves LABOR
Cuts COSTS
Increases PRODUCTION

HOUGH
Payloader

- **Bucket capacity—10½ cu. ft.**
- **Large Easy Rolling Wheels**
- **Powerful Safety Brakes**
- **Full Visibility**
- **Tip Back Bucket**

Hough Payloaders pay their way every day handling moulding and core sand, in foundries throughout the country. Fast, versatile and powerful, they replace wheelbarrow crews, cut labor costs and keep a steady supply of sand available for maximum daily tonnage.

The HA Payloader is small and compact, fits in tight spots—in railroad cars, storage bins—narrow aisles and congested areas. Easily operated, sturdily constructed, built for severe service. Handles slag—bulk materials—snow—general cleanup. Lift fork available for handling castings. Write for complete details today.



LOADING MOLDING SAND—Payloader bucket specially shaped to load quickly and easily.

CARRYING CORE SAND — Maneuvers easily through congested aisles. Tip-back bucket prevents spillage, operator has full visibility.

DUMPING CORE SAND — Payloader keeps constant supply of core sand available in main storage and auxiliary bins.

THE FRANK G. HOUGH CO.

MATERIAL HANDLING EQUIPMENT
LIBERTYVILLE, ILL.

DUST INC.

MONTHLY STATEMENT

Lowered efficiency of workers.....$?

Deterioration of machinery and equipment.....$?

Inferior quality of output.....$?

Downtime and cost of machinery repairs.....$?

Total.....$?

HOW MUCH does DUST cost YOU?

● Even though you don't actually receive a bill, you *pay* for lack of proper dust control—make no mistake about that!

If your dust control equipment is anything less than 100% adequate, it's costing you plenty in lowered worker efficiency, in over-rapid deterioration of machinery, and in many other ways.

You can rid your business of this serious cost burden . . . clear out harmful dust in your plant and keep it out . . . with an efficient, economical Dust Control System planned, designed, and installed by Kirk & Blum.

For a remodeling of present facilities or installation of a complete new system, you can safely rely on the unbiased counsel of Kirk & Blum "Air Engineers", For details, write to

KIRK AND BLUM

Engineered **Dust Control**

K & B Dust Control is *engineered* to meet individual plant needs. It's thoroughly *dependable*—backed by 39 years of experience in providing high-efficiency installations for leading plants the nation over.

The KIRK & BLUM MANUFACTURING *Co.*

2803 SPRING GROVE AVE. CINCINNATI 25, OHIO

These typical Apex ads, appearing month after month, give you the fascinating story of continuing Apex progress in achieving ingot perfection. They chart for you Apex achievement via moden science —with Research Leadership Back of Every Ingot.

APEX SMELTING

Company · Chicago 12, Illinois

A-O Absorbent Sweatband

COMFORTABLE PROTECTION AGAINST ACCIDENTS CAUSED BY BLURRED VISION

The A-O Absorbent Sweatband fits comfortably above whatever type of goggles are being worn — keeps sweat out of the eyes and off goggles — reduces the possibility of accidents caused by blurred vision—provides welcome relief for workers during the summer months.

It has adjustable headband and 7¼" sponge to cover even the widest brow — may be easily sterilized for continued use.

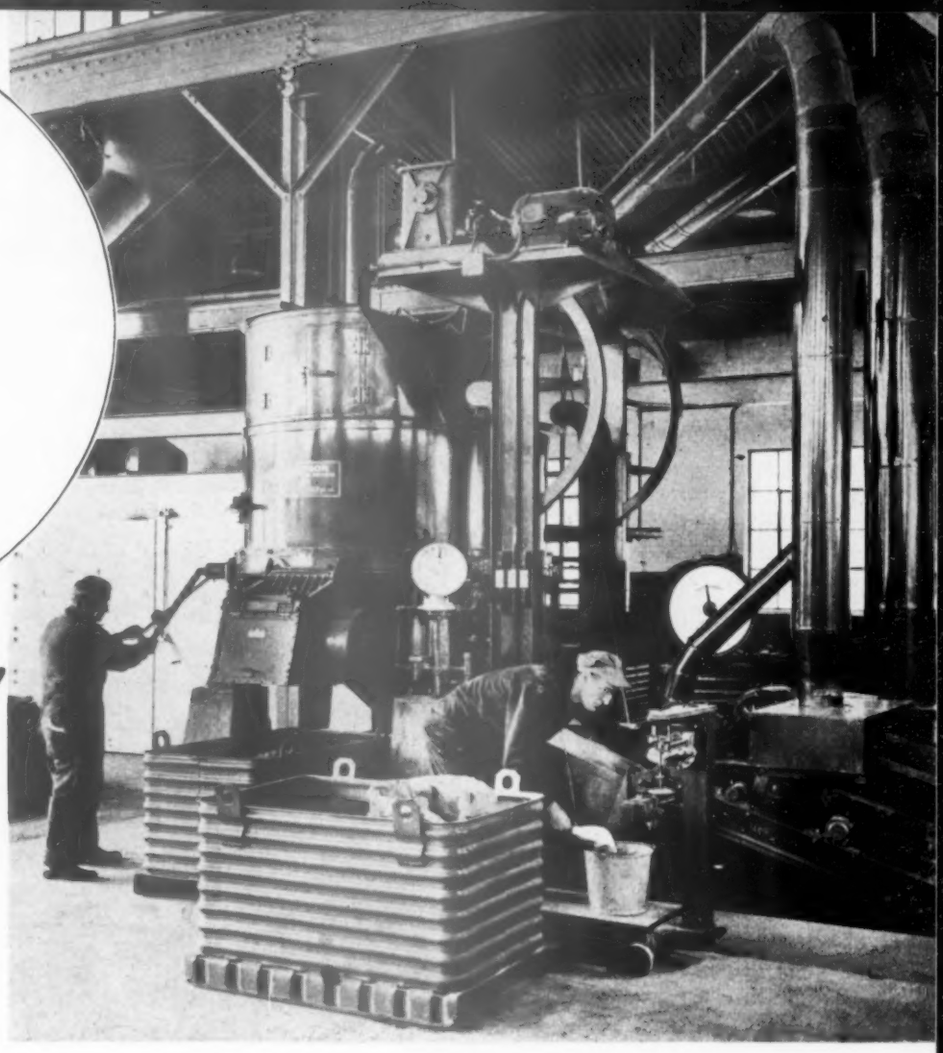
Your nearest A-O Safety Representative can supply you.

American Optical
COMPANY
Safety Division

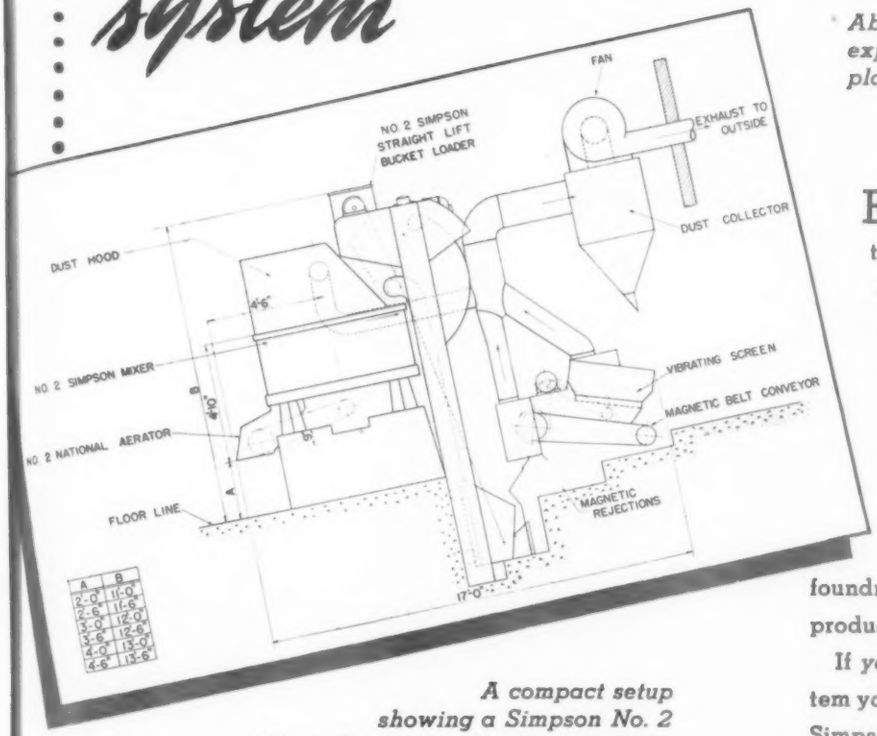
Southbridge, Massachusetts. Offices in Principal Cities

to cut castings costs in job foundries

a national compact sand system



Above: A National Sand Preparation System in the experimental foundry of the American Brake Shoe plant at Mahwah, New Jersey.



A compact setup showing a Simpson No. 2 Mixer, Bucket Loader, Aerator, Magnetic Separator and Exhaust System.

EFFICIENT sand preparation will be a most important factor in every foundry's future plans to produce better castings at lower costs. Medium and smaller capacity foundries recognize the handicap of inadequate sand conditioning without realizing that it can be easily overcome with a compact, simple and efficient National System like that illustrated here.

Thousands of Simpson Mixers and National Sand Systems are providing all types and sizes of foundries with perfectly conditioned sand that helps them produce better castings in less time, at lower costs.

If *your* sand requirements do not demand a large system you will probably find this compact arrangement of a Simpson Mixer and National Auxilliary units is ideal. Ask a National representative to discuss the details with you.

NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING • CHICAGO 6, ILLINOIS

MANUFACTURERS' ASSOCIATION, INC. FOUNDRY EQUIPMENT

Manufacturers and Selling Agents for Continental European Countries — The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia — August's Limited, Halifax, England. For Canada — Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand — Gibson, Battle & Co., Pty., Ltd., Sydney, Australia

ENGINEERED TO

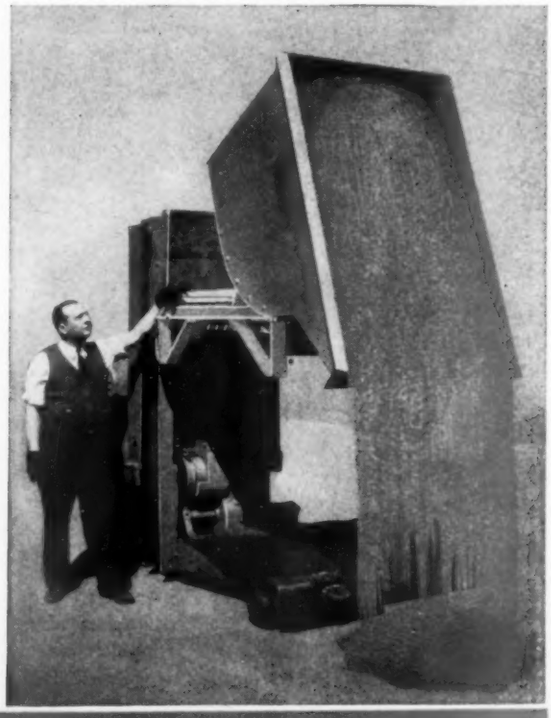
1 SAVE MONEY • 2 REDUCE FATIGUE • 3 SAVE TIME

EXPERT ENGINEERING of ROURA Self-Dumping HOPPERS gives maximum flexibility in materials handling. Efficient for any bulk material—hot, cold, wet or dry.

STURDY, ALL-WELDED CONSTRUCTION assures long, rugged use *without warping* . . . smooth seams mean clean, rapid dumping. Fits any standard type platform or fork lift truck.

OPERATING EASE saves time and effort . . . makes carrying and dumping safe. *One simple manual motion* releases hopper to automatically empty, return and lock . . . ready for the next load. EXPERIENCE RECORDS SHOW 50% CUT IN FATIGUE!!

Order one on a 30-day trial basis. Standard (1 cu. yd.) Model, $100.00 FOB Detroit. *Write for new detailed Bulletin.*

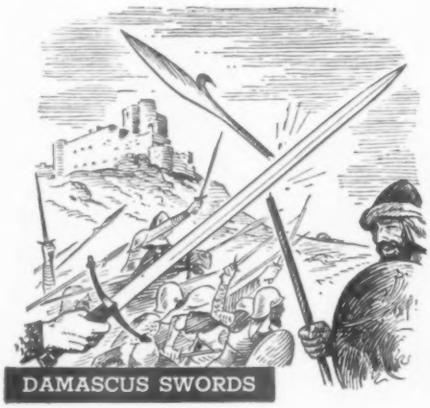


ROURA
SELF-DUMPING
HOPPERS

ROURA IRON WORKS
1405 WOODLAND AVENUE • DETROIT 11, MICHIGAN

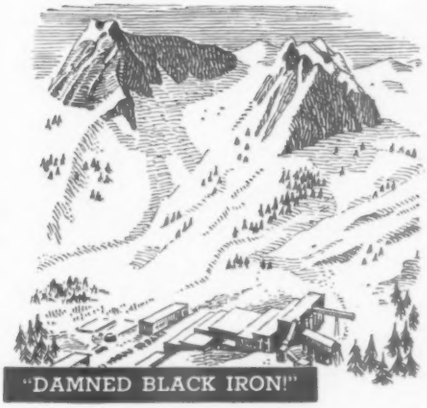
ONE OF A SERIES OF STORIES ABOUT ALLOYING METALS . . . WHERE THEY COME FROM AND HOW THEY ARE USED

THE STORY OF TUNGSTEN



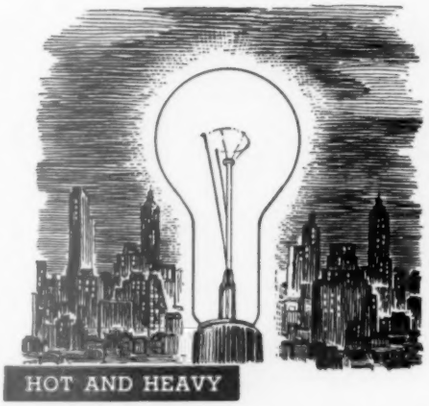
DAMASCUS SWORDS

Tungsten has been found in medieval Damascus swords — so hard they could cleave iron spears at a blow, so keen they could cut floating gossamer, so elastic they would spring back to shape after being bent to a right angle. Yet it is only for about 50 years that tungsten has been known as a valuable alloying metal.



"DAMNED BLACK IRON!"

The exciting flash of gold was the dream of miners in gold rush days. They cursed when their pickaxes rang against a stubborn black rock—one of the tungsten ores, which has since sold for as much as gold ores. Tungsten ore is mined for Electromet's furnaces by United States Vanadium Corp. (a UCC Unit) at Bishop, Cal.

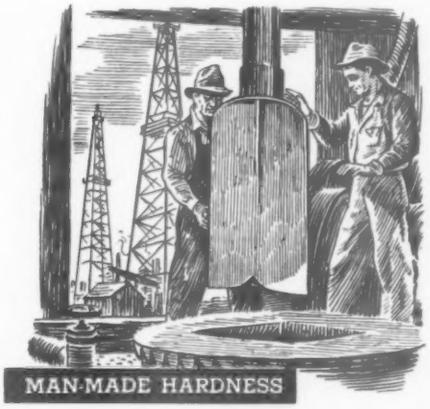


HOT AND HEAVY

Tungsten (which is Swedish for "heavy stone") gets hotter than any other metal before it melts—6,100° F. That's why it is used in electric lamp filaments and has many valuable industrial applications where high heat resistance is needed. Electromet produces pure tungsten powder, ferrotungsten, and calcium tungstate.

FOR CLOSE SHAVES

In cutting tools of high-speed steel and tungsten carbide and in the well-known HAYNES STELLITE non-ferrous alloys, tungsten produces a hard edge that stays hard even under extreme friction and high temperatures. Tungsten has other important uses, such as in the heat-resisting metals of gas turbines and jet engines.



MAN-MADE HARDNESS

Nature made the diamond, but man has created something almost as hard—tungsten carbide. This abrasion-resistant material is used for dies and tools and as a welded deposit on parts exposed to extreme wear. For instance, this tungsten alloy applied to drill bits enables oil men to drill wells almost three miles deep.

Help Wanted?

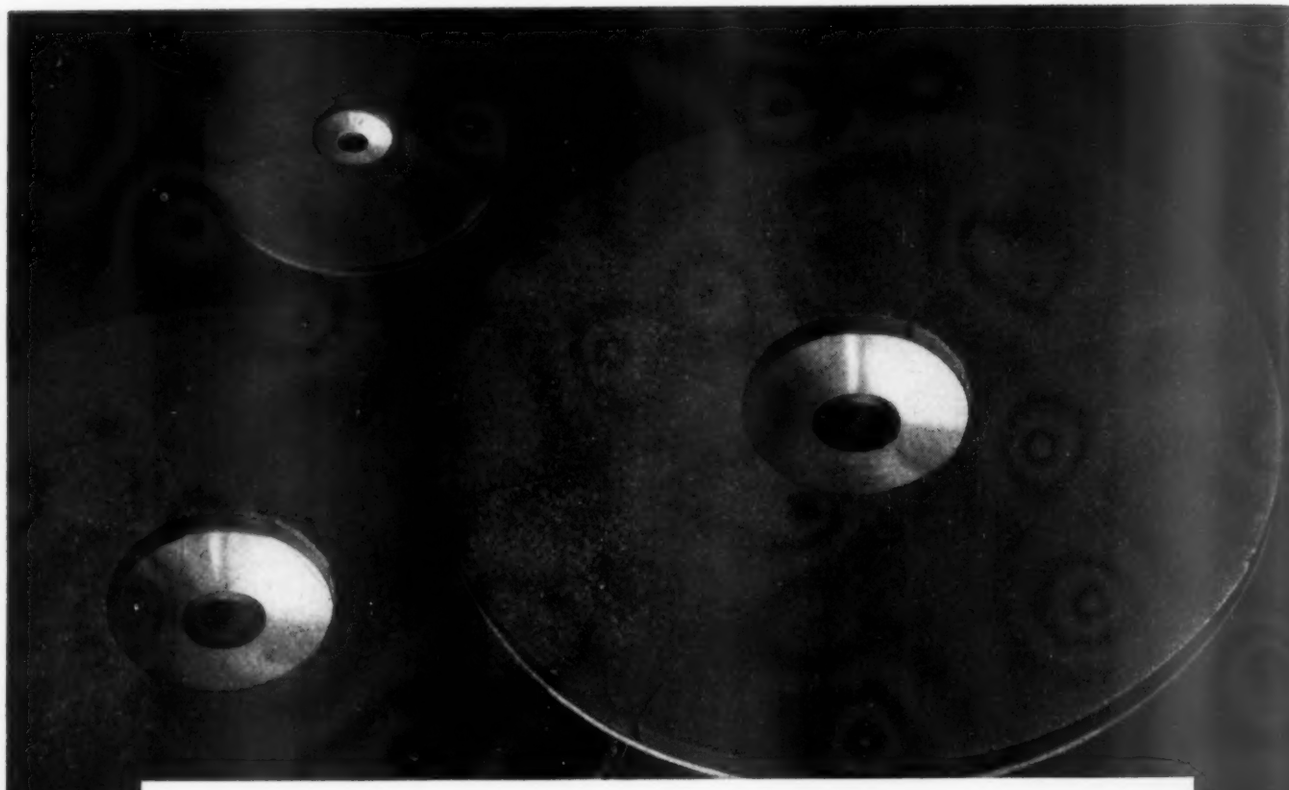
If you need help on some specific application of ferro-alloys or alloy steels, let Electromet work it out with you. Our modern, completely equipped research laboratories at Niagara Falls, New York, are staffed by men who have had years of experience in helping ferro-alloy users solve problems that arise in their plants and in the markets served by them. You can learn more about this unique service by writing to our Technical Service Department for the booklet, "Electromet Ferro-Alloys and Metals."

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

ELECTROMET Ferro-Alloys and Metals are sold by Electro Metallurgical Sales Corporation, and Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

"Haynes Stellite" is a registered trade-mark of Haynes Stellite Company

Electromet
TRADE-MARK
Ferro-Alloys & Metals



Could your grinding costs be reduced?

Men in industry have often been amazed by cost reductions accomplished by shifting to specially built Peninsular grinding wheels.

Many of these men didn't even suspect grinding costs *could* be reduced until a shift to individually engineered Peninsular grinding wheels shortened their production time.

Maybe similar savings could be made in your plant. Best way to find out is to call in Peninsular engineers.

They will study your machines, your grinding methods, and the metal to be ground. Their findings are used to develop grinding wheels to obtain maximum production speed.

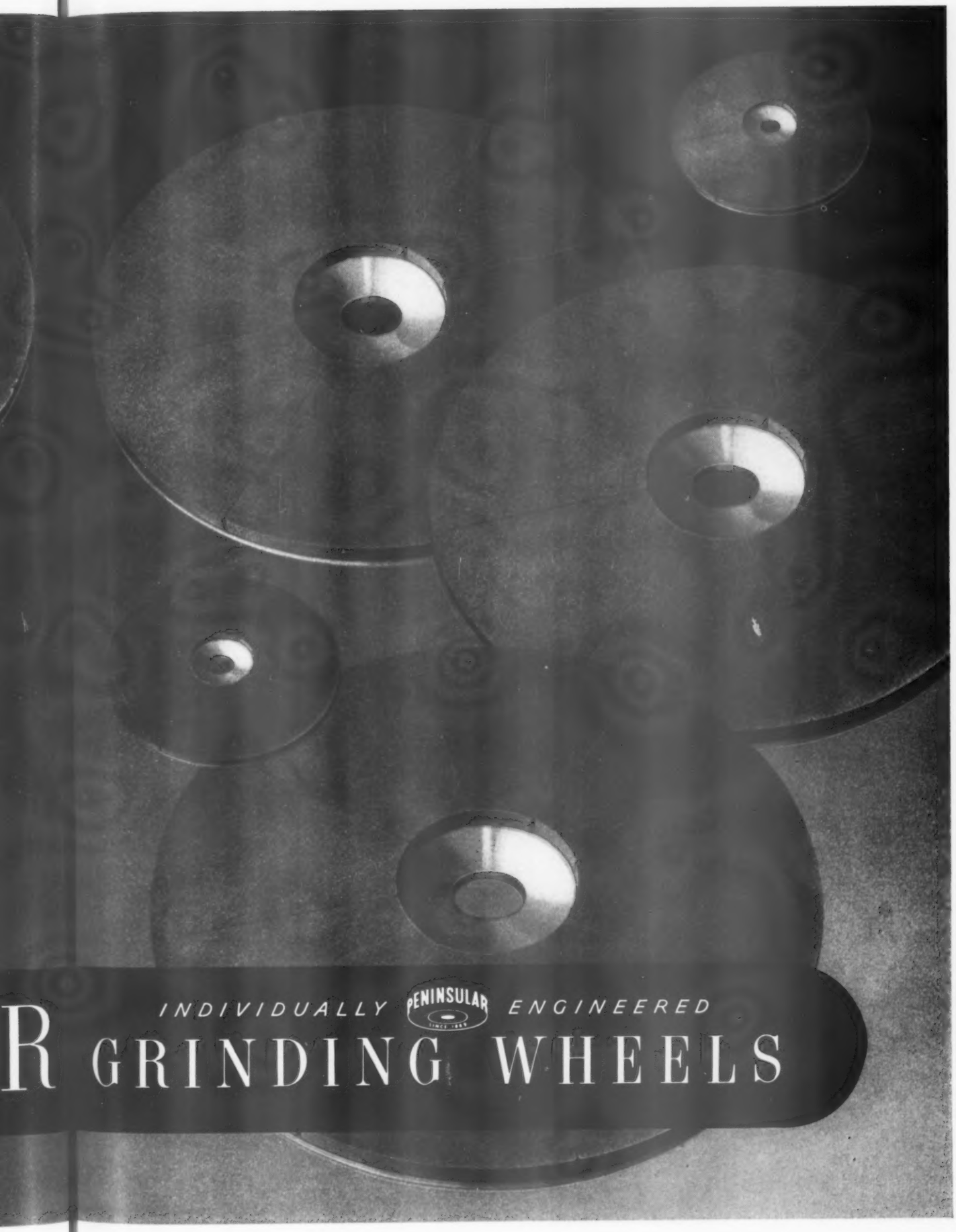
Only after such on-the-ground analysis can grinding wheels be engineered to bring your grinding costs to a minimum. *Every* Peninsular grinding wheel is specially made for its particular job.

The Peninsular Grinding Wheel Company, 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Newark, Pittsburgh, Houston, St. Louis, Cincinnati.

PENINSULAR

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS


INDIVIDUALLY PENINSULAR ENGINEERED
R GRINDING WHEELS

152 ALUMINUM FOUNDRIES of all sizes, from coast to coast, which produced over 150 MILLION POUNDS of Aluminum castings in 1945, were recently interviewed by an outside agency. Here are some of the results:

56.6% of all Aluminum cast was "SECONDARY"

and when the selection of the metal was left entirely to the foundryman:

68.5% of the tonnage cast was "SECONDARY"

There are many reasons for this preference — any member can tell you what they are. Why not ask him? The reasons are worth knowing.

Aluminum Research Institute

111 West Washington Street, Chicago 2, Illinois

MEMBER · ALUMINUM RESEARCH INSTITUTE

The National Smelting Co.
Cleveland 5, Ohio

Niagara Falls Smelting & Refining Corp.
Buffalo 17, New York

North American Smelting Co.
Tioga and Edgmont Sts.
Philadelphia 34, Pa.

Sonken-Galamba Corporation
Kansas City 18, Kansas

U. S. Reduction Co.
East Chicago, Indiana

Aluminum and Magnesium, Inc.
Sandusky, Ohio

The American Metal Co., Ltd.
New York City 6

Apex Smelting Co.
Chicago 12, Illinois

Berg Metals Corporation
Los Angeles 11, California

The Cleveland Electro Metals Co.
Cleveland 13, Ohio

Federated Metals Division American Smelting & Refining Company
New York City 5 and Branches

General Smelting Company
Philadelphia 34, Pennsylvania

Samuel Greenfield Co., Inc.
Buffalo 12, New York

William F. Jobbins, Inc.
Aurora, Illinois

R. Lavin & Sons, Inc.
Chicago 23, Illinois

Now! LIFT, MOVE, STACK Materials Electrically with NEW TRANSTACKER

PRICED AT ONLY **$1800**
(Some Models Slightly Higher)

PLATFORM TYPE TRANSTACKER
Capacity 4000 pounds
For stacking unit loads on skid platforms.

Low price brings modern material handling methods within reach of all!

NOW for the first time every business—every industry can use modern, money-saving material handling methods at new low cost.

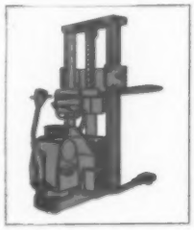
Because in the new Transtacker, Automatic's engineers have developed a high-lift stacker that sells for as low as $1800. And while it will move, lift and stack up to 4000 pounds, it weighs only 1900 pounds. This means you can safely use Transtacker, even if your floor and elevator capacities are limited.

With all the advantages of the famed Transporter that moves any kind of material with amazing "touch-of-your-thumb" ease, Transtacker now gives you an electric hydraulic lift that stacks your product at new heights to increase storage capacity. With finger-tip control it lifts up to 4000 pound loads in a matter of seconds . . . smooth, controlled lowering speed for utmost safety. Mail coupon for facts.

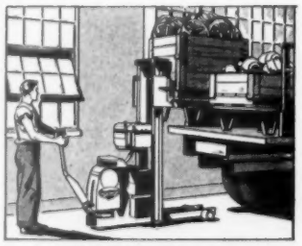
OPEN FACE PALLET TYPE TRANSTACKER—Capacity 3000 pounds—With suitable forks for stacking open face pallet loads.

SUSPENDED LOAD TYPE PALLET TRANSTACKER—Capacity 2500 pounds—With suitable forks for stacking double or open face pallets.

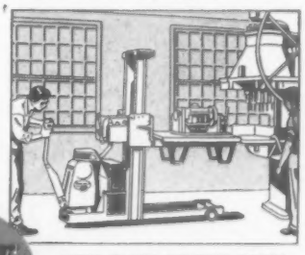
STRADDLE TYPE PALLET TRANSTACKER—Capacity 4000 pounds—With suitable forks for stacking double face or open face pallet loads.



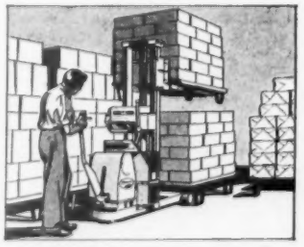
FINGER TIP CONTROLS LOAD
Cartons, crated goods, hard-to-handle material—one man or girl hauls, lifts and stacks to full storage heights.



ENORMOUS SAVINGS IN SHIPPING
Pick up merchandise from ground level and deposit it on truck or trailer. A three-man operation becomes a one-man operation.



LIFTS HEAVY MACHINE PARTS
When heavy machine parts must be lifted to working height, let Transtacker safely lift it and place it.



ENDS BACK-BREAKING HANDLING
This can be *your* trucker—easily, efficiently stacking your material with Transtacker. Extra storage space is yours free.

PRE-TESTED IN INDUSTRY

1. Cuts loading and unloading time in half.
2. One man does the work of three with less effort—Transtacker cuts handling costs up to 60%.
3. Light in weight for limited floor and elevator load capacity.
4. Hauls any kind of product with "touch-of-thumb" ease.
5. Gives you extra storage space without added cost.
6. Lifts and stacks product from ground level to trucks and trailers.

LOOK TO THE LEADER FOR ALL THAT'S NEW!

Transtacker
A PRODUCT OF AUTOMATIC
Lightens LIFE'S LOADS

AUTOMATIC TRANSPORTATION COMPANY
DIV. OF THE YALE & TOWNE MFG. CO.
121 West 87th St., Dept. M, Chicago 20, Illinois

Please mail me without cost or obligation, complete facts about the NEW TRANSTACKER.
( ) Have an A.T.C. Specialist call and survey my material handling costs.

Company Name.....
By.....*Position*.....
Street Address.....
City.....*State*.....

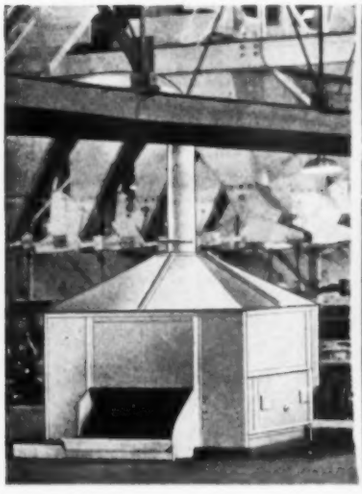
THE ANSWER TO SHAKEOUT DUST CONTROL

MEMBER
MANUFACTURERS ASSOCIATION INC. FOUNDRY EQUIPMENT

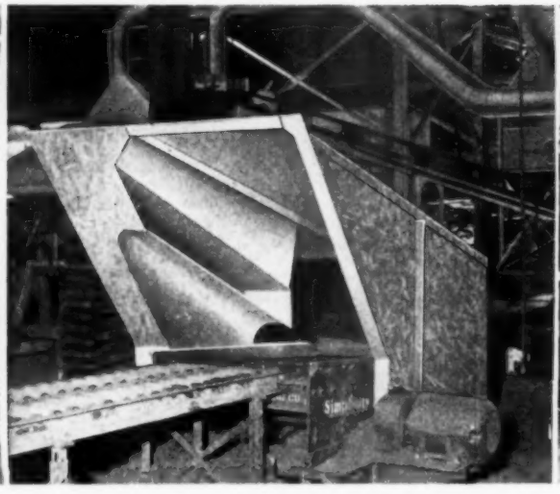
Type W Roto-Clone in automotive foundry; a size of flask and use of mold conveyor permit installation of overhead hood above shakeout.

● AAF-engineered side hoods exhausted by Type W Roto-Clones offer the most practical method of dust control for foundry shakeouts. Many ingenious hood arrangements have been developed to take care of dust and fumes without interfering with the shakeout operation. The Type W Roto-Clone has proved most satisfactory for this service because it successfully collects the extremely fine dust and is not affected by steam or vapor contained in the exhaust air.

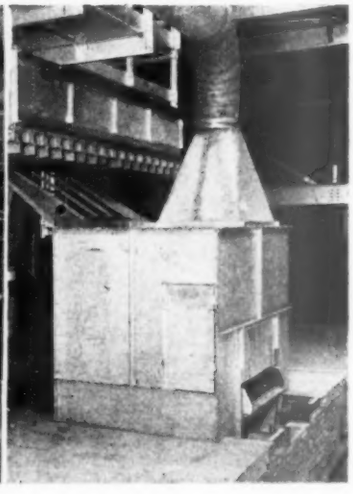
For complete information on Roto-Clone for every foundry dust problem, send for Bulletin No. 274A.



Complete enclosure; applicable with automatic handling of molds.



Combined side and overhead hood with hinged top permits use of crane; underground duct to Roto-Clone.



Semi-enclosure; open front permits handling of molds by operators.

ANOTHER AAF PRODUCT

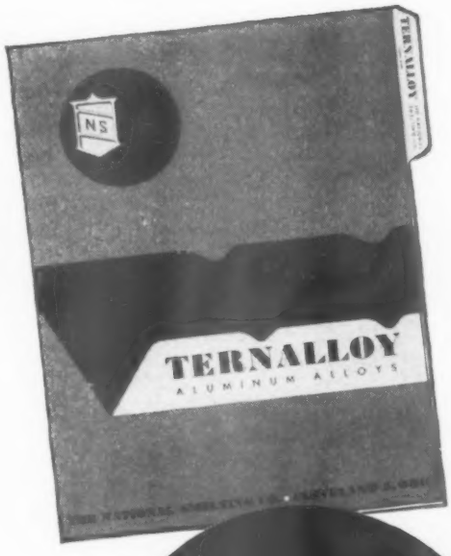
AMERICAN AIR FILTER COMPANY, INC.
INCORPORATED
266 Central Avenue Louisville 8, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

*Roto-Clone is a registered trademark for a dynamic precipitator or hydrostatic baffle-type wet collector.

ROTO-CLONE
FOR FOUNDRY DUST CONTROL

Announcing....

TERNALLOY
ALUMINUM ALLOYS



A SERIES OF ALUMINUM-MAGNESIUM-ZINC ALLOYS OFFERING UNUSUAL ADVANTAGES

Ternalloy Aluminum Alloys, developed out of a background of 35 years' experience in light metals, *have exceptionally high strength without heat treatment.* Other advantages are dimensional stabililty, excellent machinability, good polishing characteristics and good corrosion resistance.

New illustrated bulletin containing full information, including charts and specifications, will enable foundrymen and designers to become acquainted with the Ternalloys and evaluate them for their products.

The accompanying coupon attached to your company letterhead will bring a copy.

THE NATIONAL SMELTING COMPANY
6706 GRANT AVENUE • CLEVELAND 5, OHIO

Send for **NEW BULLETIN**
(FILL IN AND ATTACH TO COMPANY LETTERHEAD)

THE NATIONAL SMELTING COMPANY
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NATIONAL NS SMELTING

If you need a long-life compressor...one that has the stamina to generate Air Power continuously at full capacity, 24 hours every day, week after week... *you need an Ingersoll-Rand Class "ES."*

This heavy-duty compressor is designed, built, tested, and rated for severe service throughout many years. In addition, it is the most efficient, trouble-free single-stage compressor available. For these reasons an "ES" will save you hundreds, perhaps thousands, of dollars during its lifetime.

Whenever you have problems concerning Air Power... its generation, its distribution, or its thousands of labor-aiding uses...call on an I-R Engineer. He can help you in many ways.

WITH "ES" *Heavy Duty* COMPRESSORS

- Sizes 5 to 125 hp.
- Liberal valving with Channel Valves.
- Free-air unloaders on each inlet valve.
- Thorough water-jacketing around all valves.
- Completely accessible, oil-tight frame.
- Double-row Timken bearings.
- Constant-speed control; or dual control, permitting either constant-speed or automatic-start-and-stop.
- Pressures 5 to 150 psi single stage.
- Also to 500 psi two-stage; 2500 psi three-stage.
- V-belt, flat-belt, or drive by synchronous motor mounted on crankshaft. Also steam drive with steam cylinder between air cylinder and frame.

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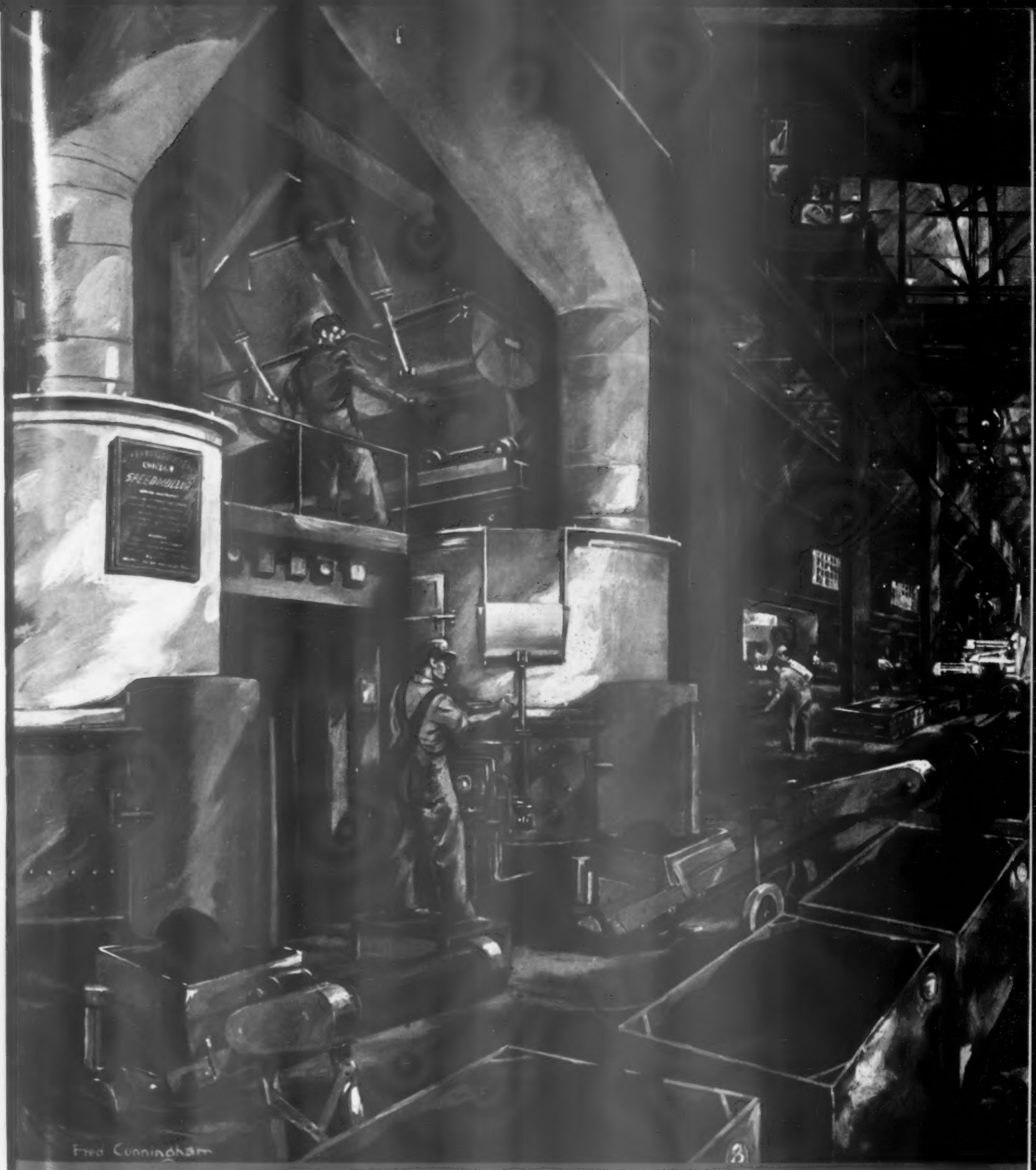
COMPRESSORS · AIR TOOLS · ROCK DRILLS · TURBO BLOWERS · CONDENSERS · CENTRIFUGAL PUMPS · OIL AND GAS ENGINES



Speedmullors operating at Commercial Steel Casting Co. as painted by Fred Cunningham.

Speedmullors...THE BETTER METHOD OF MULLING!

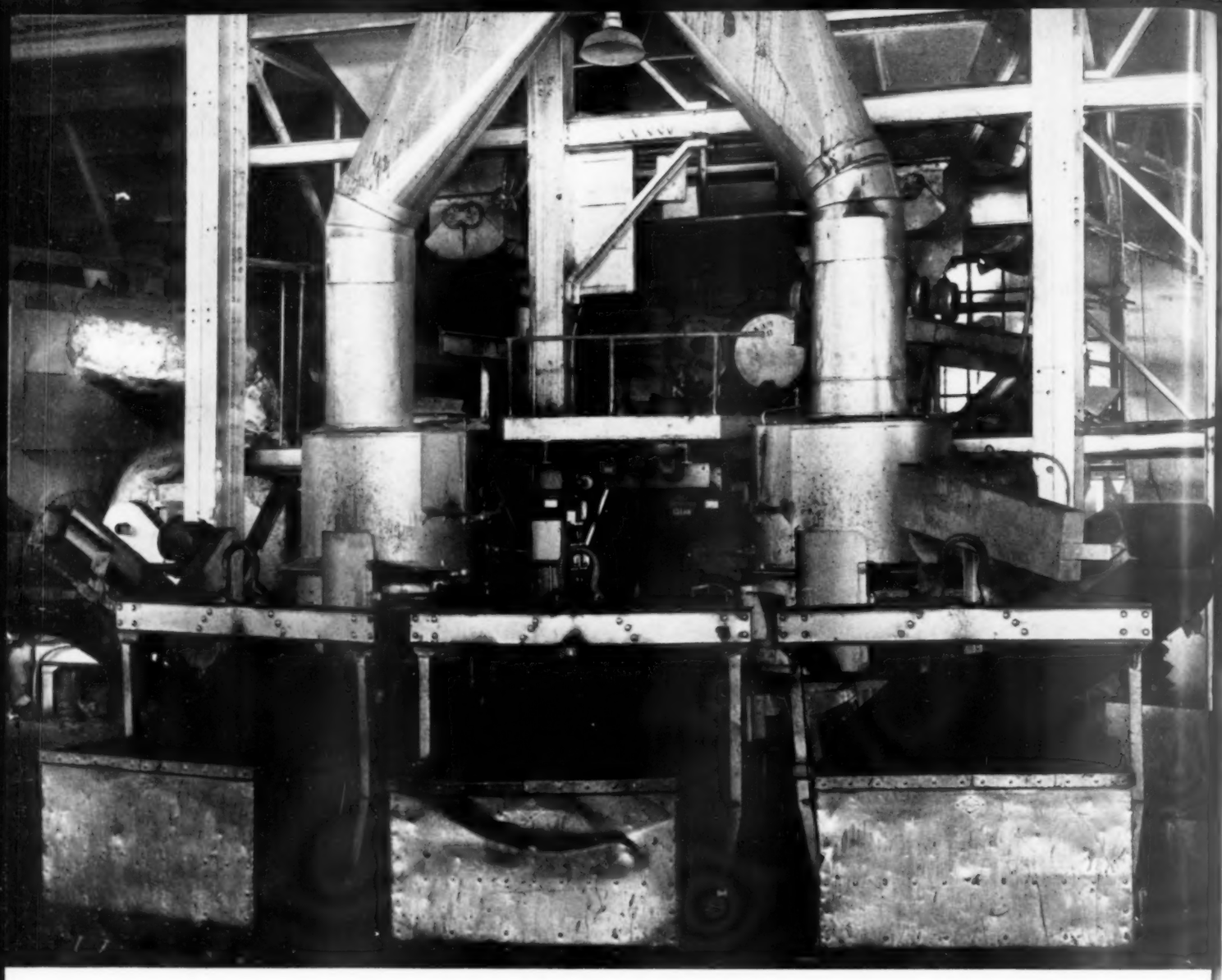
Foundry records at Commercial Steel Casting Co., Marion, Ohio, prove that Speedmullors produce the most thoroughly mulled sand—in less time—and at lower cost. (See story on following pages.)

Three Speedmullors, two of which are shown in the above painting, mull all the sand for Commercial's entire foundry. The mulling, sand handling and Sandslinger set-up is an excellent example of foundry efficiency.

THE BEARDSLEY & PIPER COMPANY

General Offices: 2424 North Cicero Avenue Plant: 2541 North Keeler Avenue
CHICAGO 39, ILLINOIS

The Beardsley & Piper Company are manufacturers of Sandslingers, Speedslingers, Speedmullors, Screenarators, Mulbaros, Shake-outs, Sand Conditioning Machines, Gyratory Screens



Speedmullors MULL AND COOL THE SAND AT COMMERCIAL STEEL CASTING COMPANY

Typical of all mechanized units where shakeout sand is stored in hoppers in large amounts, the sand at Commercial Steel retains considerable heat. Because this sand is hot, proper mulling would be impossible if it were not for the fact that the two Speedmullors in the molding sand unit are equipped with air cooling systems that quickly bring the sand back to within 5 to 10 degrees of room temperature. This extremely important feature is one of the many Speedmullor advantages that provides better sand control.

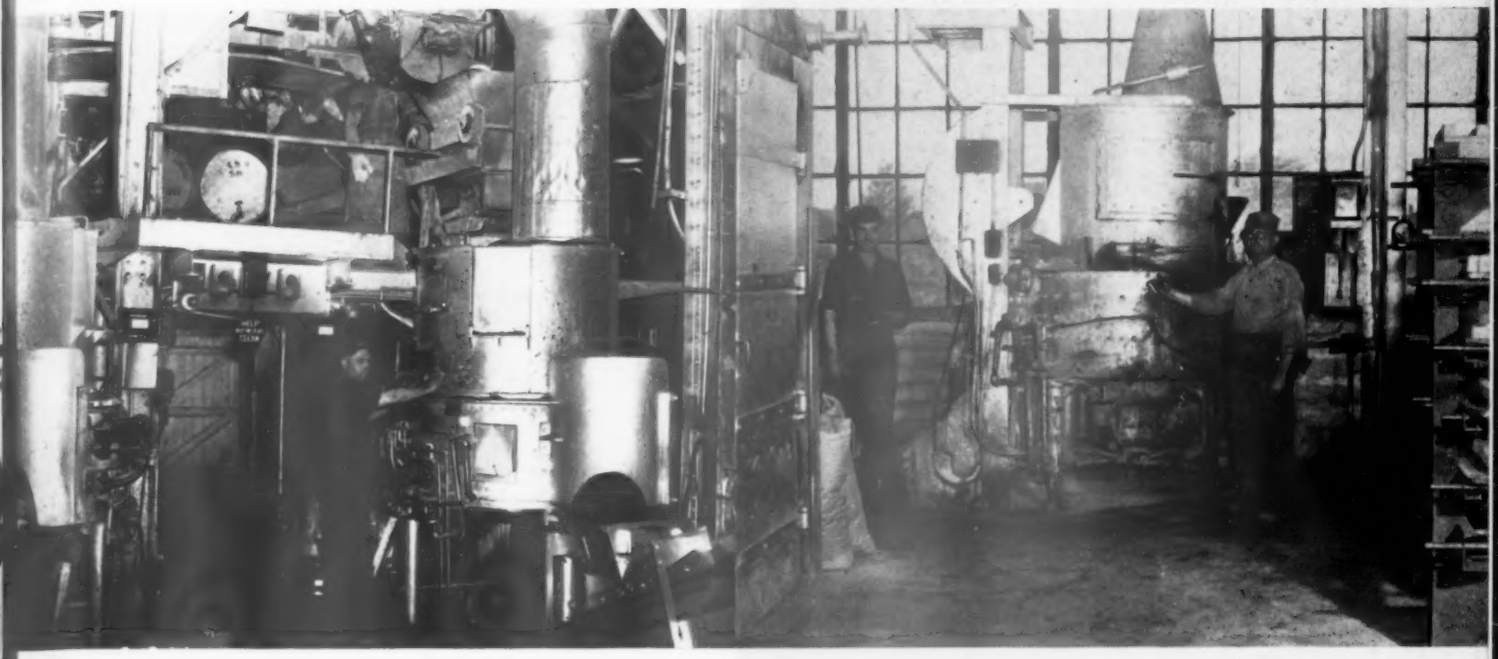
Commercial's records show that the Speedmullors *reduce mulling time at least 50% when compared to their previous mixer.* Control of sand quality is now possible because of the thorough, uniform mulling of the Speedmullors.

B&P

THE BEARDSLEY &

General Offices: 2424 North Cicero Avenue Plan

CHICAGO 39, ILLI

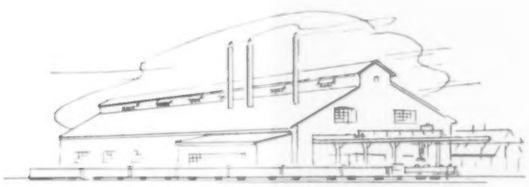


These Model "50" Speedmullors with air cooling, mull all the sand for the Motive Jr. Sandslinger and other molding units. New sand, old sand and additions are fed automatically into either mullor. Overhead sand storage bins have a capacity of 200 tons of return sand and 75 tons of new sand. Batches are quickly made with a minimum of effort from the overhead platform with two larries that run above the mullors and discharge directly into them. The mulled sand is conveyed on short inclined belts, discharging into portable buckets which are carried by crane to the Sandslinger or other molding stations.

This is the Model "40" Speedmullor serving the entire coreroom. With the installation of the new sand system, the two Speedmullors for molding sand and the Speedmullor for the coreroom, a modern sand laboratory was established. The old system of sand handling and mixing was so haphazard that a sand laboratory would have been useless. Now, however, sand quality is rigidly controlled by regular batch testing. Speedmullors produce sand to exact specifications in less time per batch than any other mulling method. They assure large savings in core oils and binders.

The Speedmullor incorporates all the essential requirements for perfect mulling: (1) Pressure—continuous squeezing without damaging sand structure; (2) Rapid agitation—entire batch receives thorough mulling; (3) Blending—uniform distribution of bonding elements; (4) Thorough aeration. The Speedmullor is the only machine that mulls the sand between a rubber-lined wall and rubber-tired wheels. These surfaces will not destroy the sand grain structure, and will outlast steel many times. Write for catalog today!

Speedmullors are available in a variety of sizes — to meet the requirements of every foundry—large or small. They are made with or without skiphoist; air cooling; fines removal.



E Y & PIPER COMPANY

Avenue Plant: 2541 North Keeler Avenue

GO 39, ILLINOIS

Screen THE SAND WITH . . . . . SCREENARATORS

The Screenarator . . . Modern, Portable Sand Conditioner!

The Screenarator is the lowest cost portable sand conditioner! Ideal for small, medium and large foundries, it is fast, versatile and produces a flowable, easily rammed sand.

The Screenarator thoroughly screens the sand . . . frees it from burned cores, gaggers and other foreign matter. It cuts and breaks lumps, aerates the sand, and then aerates it for the second time when it piles the conditioned sand between benches, into boxes, hoppers, windrows, or wherever desired. Write for a Screenarator catalog describing the three models!

Mull THE SAND WITH . . . . . MULBAROS and SPEEDMULLORS

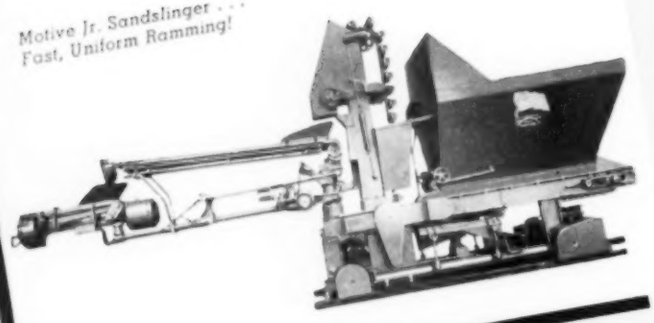
The Mulbaro . . . The Only Portable Mullor!

The Mulbaro . . . outstanding in its portability, efficient mulling and low initial cost. Available in two sizes: 3½ cu. ft. capacity (2 wheel model) and 7 cu. ft. capacity (illustrated). Small foundries use it as a versatile, all-purpose mullor . . . medium and large foundries find it valuable as an auxiliary mullor. It is comprised of two sections; top section is the mulling mechanism which lowers onto barrow containing the sand to be mulled. As soon as one batch is mulled, another barrow filled with sand, can be placed under the mulling unit, providing continuous operation. Ask for a Mulbaro catalog now!

(Speedmullors described on preceding pages.)

Ram THE SAND WITH . . . . . SANDSLINGERS and SPEEDSLINGERS

Motive Jr. Sandslinger . . . Fast, Uniform Ramming!



Sandslingers . . . for fastest ramming! The "Slinger" rams any variety and size of molds in less time, more uniformly, and at lower cost. There are many types of Sandslingers and Speedslingers to meet the special requirements of small, medium or large foundries. See the "Slinger" in operation. We will make arrangements for you to visit a nearby foundry to view this modern machine in action. Write today!

Catalogs are available on all B & P equipment giving details as to various sizes and models plus installation and price information. Write for a catalog now. The Beardsley & Piper Company have representatives in various sections of the United States and in many foreign countries.

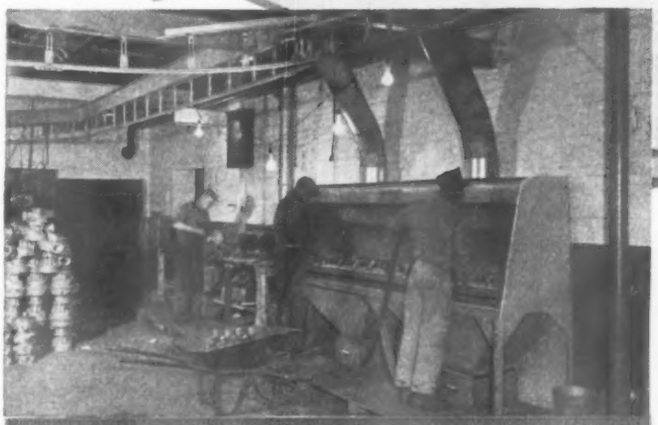
THE

BEARDSLEY & PIPER COMPANY

General Offices: 2424 North Cicero Avenue **Plant: 2541 North Keeler Avenue**

CHICAGO 39, ILLINOIS

Complete SCHNEIBLE DUST CONTROL for a Southern Michigan Brass Foundry



Schneible Ventilated Bench, used as a core knockout and sprueing station.

The mold shake-out at this brass foundry is ventilated by the plant's Schneible system.

In this large Michigan non-ferrous foundry, dust and fumes do not slow up the workers. The dust from shakeout, sand preparation and core knockout operations is continuously removed from the working zones for trouble-free disposal in a Schneible Multi-Wash Collector.

This foundry, in keeping with the trend in dust control installations for the peacetime era, uses proved Schneible equipment.

Schneible Multi-Wash systems provide complete control of dust and fumes at the lowest ultimate cost. A Schneible system functions for long periods without attendance and with a very minimum of maintenance. The collectors have no parts to break, burn, clog or rapidly wear, and provide simple sludge disposal.

Write for informative literature on Schneible Dust and Fume Control Equipment.

CLAUDE B. SCHNEIBLE CO.

2827 Twenty-Fifth St. Detroit 16, Mich.

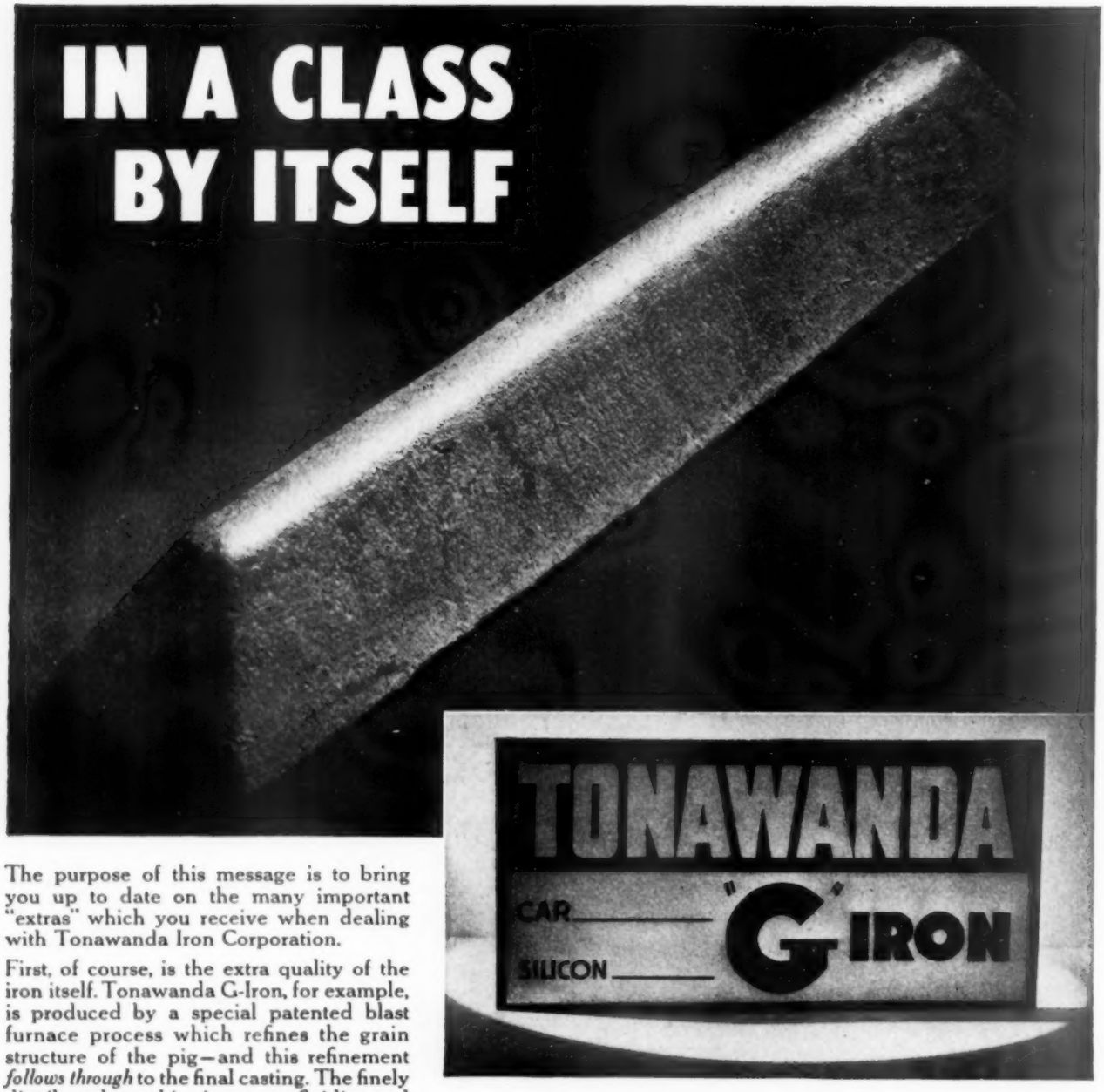
Offices in Principal Cities

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

SCHNEIBLE

LIQUID-VAPOR INTIMATE CONTACT EQUIPMENT for DUST COLLECTION ABSORPTION CONDENSATION AND TEMPERATURE REDUCTION

IN A CLASS BY ITSELF



The purpose of this message is to bring you up to date on the many important "extras" which you receive when dealing with Tonawanda Iron Corporation.

First, of course, is the extra quality of the iron itself. Tonawanda G-Iron, for example, is produced by a special patented blast furnace process which refines the grain structure of the pig—and this refinement *follows through* to the final casting. The finely distributed graphite increases fluidity and reduces chill in thin sections—improves machinability and helps to overcome internal shrinkage and porosity between thin and heavy sections.

Secondly, each car of Tonawanda Iron contains a durable sign, showing the car number and silicon content for quick identification upon arrival and when unloaded...an added service to make your job a little easier.

Thirdly is the Silicon-Carbon Chart for G-Iron—yours for the asking—especially designed to help you make sound castings using G-Iron.

Foundrymen everywhere agree that it is these and other helpful "extras" which put Tonawanda Iron Corporation—in a class by itself!

TONAWANDA
for sound castings

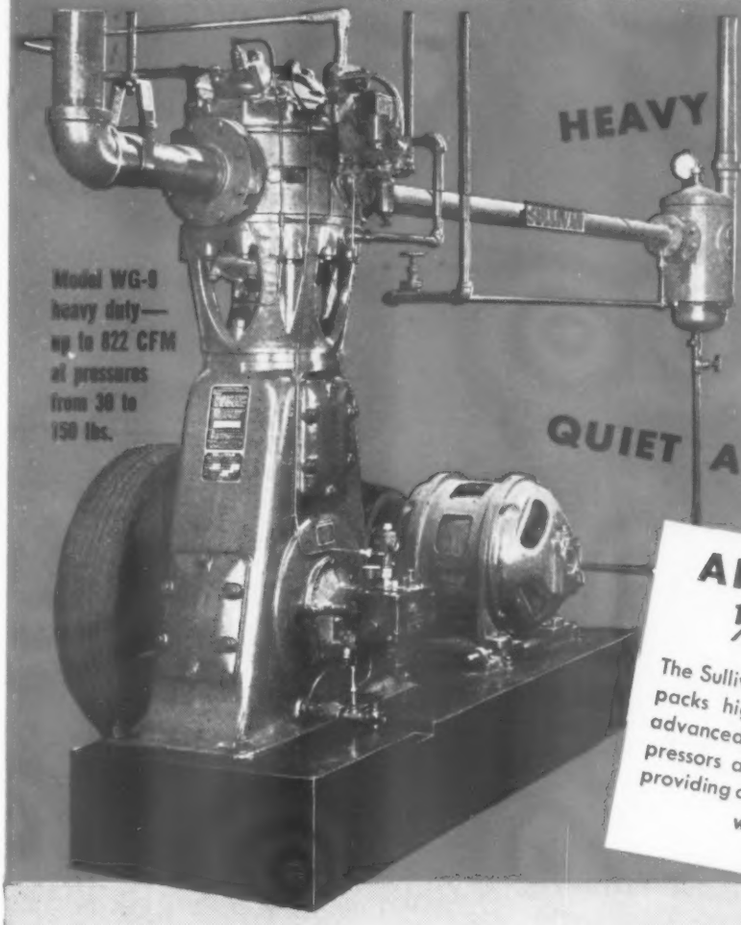
TONAWANDA IRON CORPORATION

NORTH TONAWANDA, N. Y.

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

SAVE FLOOR SPACE

WITH EFFICIENT SULLIVAN COMPRESSORS



Model WG-9 heavy duty—up to 822 CFM at pressures from 30 to 150 lbs.

HEAVY DUTY

TROUBLE FREE

PRECISION-BUILT

QUIET AND COMPACT

AIR COMPRESSORS
¼ HP to 600 HP

The Sullivan WG-9, like *all* Sullivan Air Compressors, packs high capacity into minimum space through advanced engineering and design. Sullivan Compressors are in satisfactory use throughout industry, providing dependable air power year in and year out.

WRITE FOR BULLETIN A-43 WHEN YOU WANT COMPLETE DETAILS.

SULLIVAN

STATIONARY AND PORTABLE AIR COMPRESSORS

W&D 1506

Consult a Joy Engineer

SULLIVAN DIVISION

JOY MANUFACTURING CO.

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH, PA.

Step-Up Production

WITH

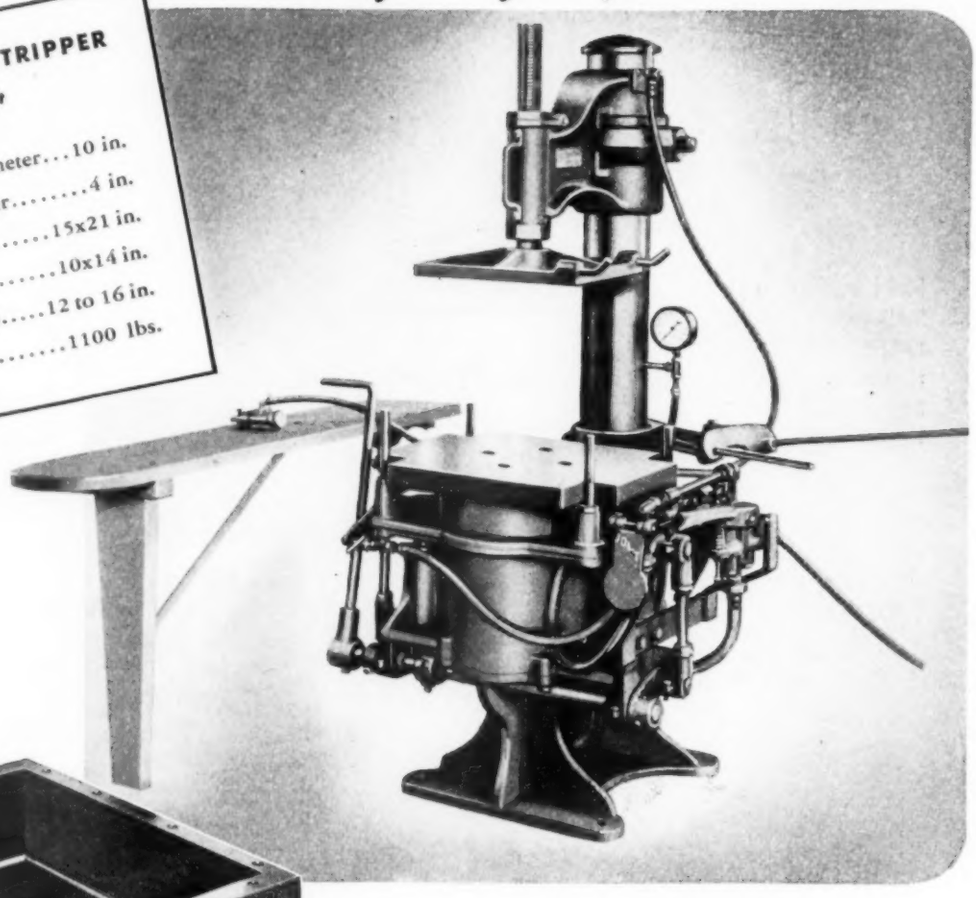
ARCADE

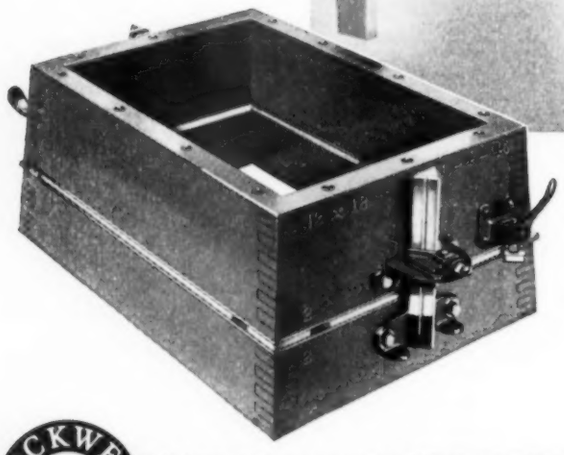
Molding Equipment

JOLT SQUEEZE STRIPPER

With Hand Lift

Squeeze Cylinder Diameter	10 in.
Jolt Cylinder Diameter	4 in.
Table	15x21 in.
Squeeze Plate	10x14 in.
Pin Lift Adj., Width	12 to 16 in.
Weight Crated	1100 lbs.





CHERRY SLIP FLASK

5 Degree Taper

Accurate dimensions . . . free moving sand strips . . . milled pins and ears for squeezer and bench work or round pins for machine molding . . . steel jackets to match.

Write for Complete Information

ARCADE MANUFACTURING DIVISION

ROCKWELL MANUFACTURING COMPANY

FREEPORT, ILLINOIS

FAST EASY-TO-CONTROL MELTING FOR *Precision Castings* WITH AJAX-NORTHRUP FURNACES

CONTINUOUS FLEXIBLE PRODUCTION

A battery of Ajax-Northrup furnaces, all served by one or two generators, permits smooth flow on large orders, and rapid handling of rush work. Change-over from one alloy to another is quick. Pouring can be done either by crucible or directly into the molds.

The engines, turbines, and tools of the future will require tough-to-machine alloys, cast by precision methods. Even with easy-to-work metals, savings in machining alone will point to precision casting of intricate parts. Progress in the lost-wax process has already made possible turbo-supercharger buckets cast of cobalt-base alloys that keep their strength at 1600° F.

Precision casting means precision melting, and precision melting means Ajax-Northrup high-frequency furnaces. Melting is done in a matter of minutes — so fast there is no chance for contamination or oxidation. Alloy composition is uniform; the furnace stirs as it melts. Pouring temperatures are exact.

Ajax-Northrup precision melting furnaces are available with capacities from 8 oz. to 50 lbs. with converter power source, and capacities from 10 lbs. to several tons with motor-generator power source. A typical installation is a generator-operated furnace that melts 150 lbs. of cobalt-base alloy in 20 minutes. That's real production speed. Write Ajax for more facts about melting with high-frequency.

92

AJAX NORTHRUP *Since 1916*

AJAX ELECTROTHERMIC CORP., AJAX PARK, TRENTON 5, N. J.

HIGH-FREQUENCY HEATING · MELTING

AJAX METAL COMPANY, Non-Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting
AJAX ELECTRIC CO., INC. The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ENGINEERING CORP., Ajax-Tama-Wyatt Aluminum Melting Induction Furnaces

ASSOCIATE COMPANIES

Prevent *these Casting Defects*

BLOWS
BUCKLES
CUTS
DIFFICULT SHAKE-OUTS
DIRT
FISSURES
HOT TEARS
METAL PENETRATION
RAT TAILS
SCABS
VEINING

THE DILATOMETER SHOWS BY THESE TESTS HOW SAND AND COATINGS WILL BEHAVE AT POURING TEMPERATURES

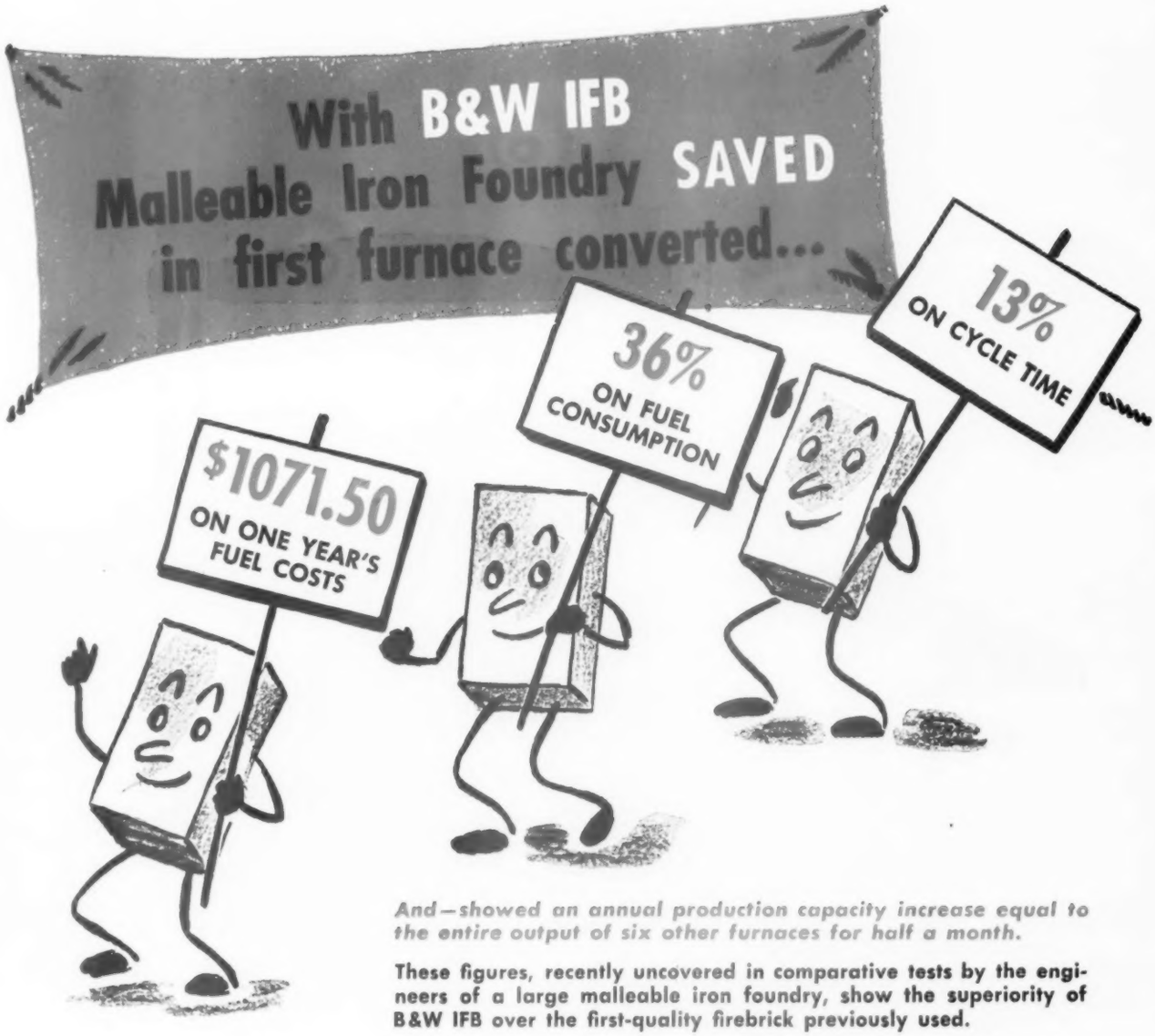
COLLAPSIBILITY
DEFORMATION
EFFECT OF ATMOSPHERES
EXPANSION AND CONTRACTION
GAS PRESSURE
GAS VOLUME
PERMEABILITY
PROTECTIVE COATING
REFRACTORINESS
SPALLING
STRENGTH

OTHER CASTINGS CONTROL EQUIPMENT—Other Dietert equipment which is minimizing scrapped castings in foundries throughout the country includes the Moisture Teller, the Permeability Meter, the Universal Sand Strength Machine, and others.

LABORATORY SERVICE—The services of a complete modern sand laboratory, the consultation of foundry specialists, are always available to you for the solution of difficulties you may encounter from day to day in your own work. The time to stop trouble is when it begins. Send defective samples promptly to the Detroit Laboratories before losses build up. This is a nonprofit operation maintained solely to assist you.

2080

HARRY W. DIETERT CO.
9324 ROSELAWN AVENUE • DETROIT 4, MICHIGAN



And—showed an annual production capacity increase equal to the entire output of six other furnaces for half a month.

These figures, recently uncovered in comparative tests by the engineers of a large malleable iron foundry, show the superiority of B&W IFB over the first-quality firebrick previously used.

And here is the reason: The lighter weight of B&W IFB, together with their lower heat-storage capacity, permit marked reductions in heating up time. Moreover, B&W IFB come to temperature on the surface quickly. Heat is kept within the furnace where it does productive work.

If you want to institute such savings in your foundry, write today for bulletin R-2-H. Or call in your local B&W Refractories engineer.

R-250

B&W

Water-Tube Boilers, for Stationary Power Plants, for Marine Service . . . Water-Cooled Furnaces . . . Superheaters . . . Economizers . . . Air Heaters . . . Pulverized-Coal Equipment . . . Chain-Grate Stokers . . . Oil, Gas and Multifuel Burners . . . Seamless and Welded Tubes and Pipe . . . Refractories . . . Process Equipment.

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
85 LIBERTY STREET, NEW YORK 6, N.Y.

The 12"-38" Adams Jolt Squeezer, Portable Type

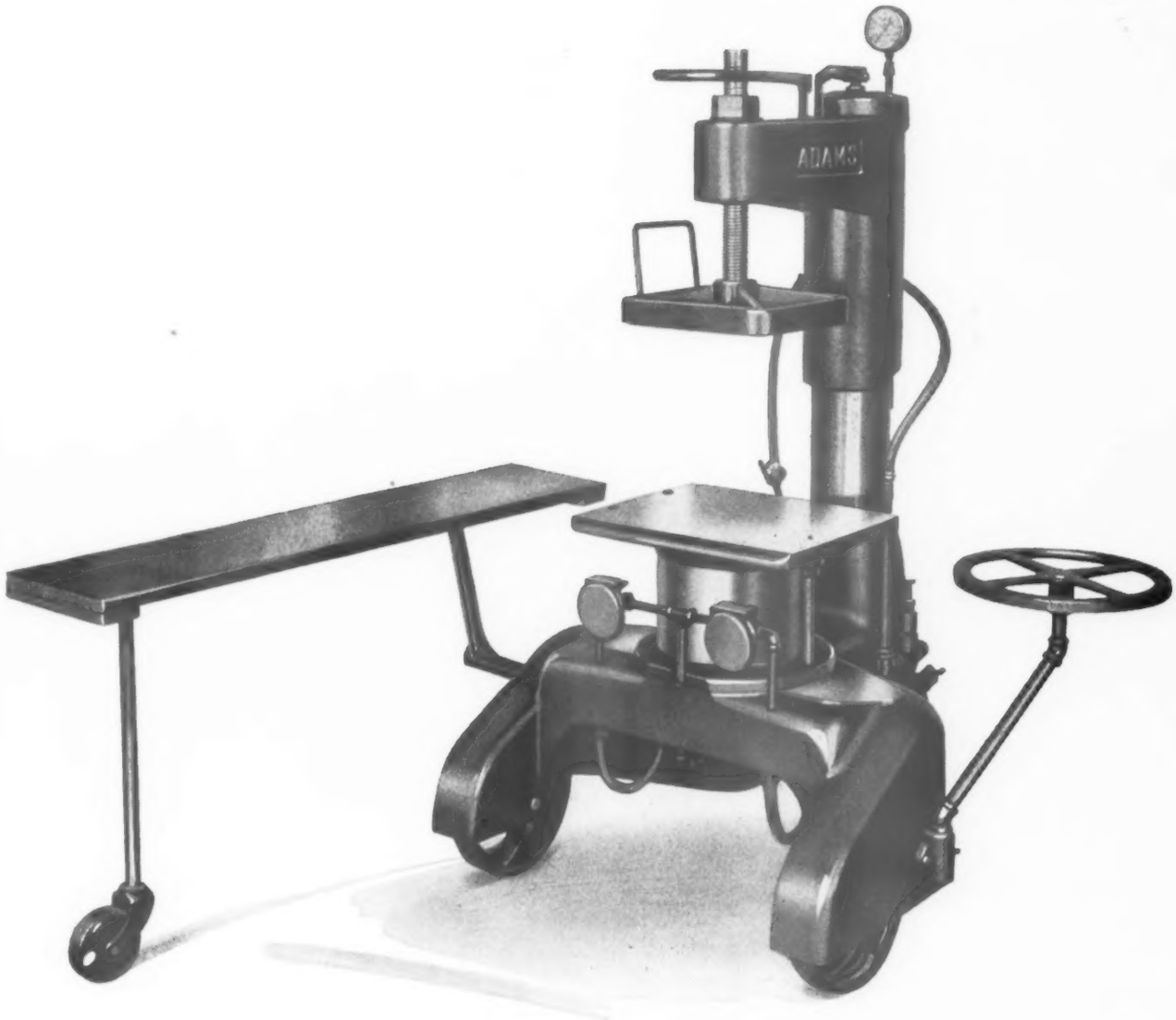
Produce Efficiently...Use

EFFICIENT DESIGN— Simplicity in design has been a characteristic of Adams Molding Machines for the past fifty years. The importance of this factor is expressed in the efficient performance of our current line.

PRECISION MANUFACTURE— The most modern equipment is used in the manufacture of these machines, and unusually close tolerances have been established. All parts are interchangeable.

THE ADAMS COMPA

MOLDING MACHINES · FLASK



The 10" Post Type Jolt Squeezer, Portable Type

Adams Molding Machines

LESS MAINTENANCE— Careful selection of materials and reduction of moving parts to a minimum makes upkeep negligible. Centralized automatic lubrication and protection against sand and dust assist in reducing wear.

EASY OPERATION— Everything possible has been done to provide convenience for the operator, and this is reflected in increased output. Operating controls are properly located to reduce lost motion.

NY · DUBUQUE, IOWA · U.S.A.

EQUIPMENT *Established 1883*

DESPATCH *Coremaster* DRAWER TYPE OVEN

It's a surprising fact, confirmed by the experience of many foundries, that a DESPATCH Coremaster can provide correctly baked cores *faster than any other type of oven!*

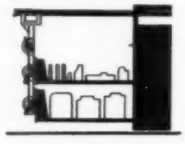
There are two sound reasons for this. *First*, the oven has an ingeniously engineered heating system which allows exceptionally rapid, uniform baking in all drawers of capacity loads (the specific baking time, of course, depending on moisture content, mass, shape and other normal variables common to any baking job).

Second, and of utmost importance, a *Coremaster* allows *continuous* baking, with space in drawers being immediately available for newly-molded cores, large or small, thick or thin. Result: minimum time between molding and casting.

Order today for early delivery!

48 standard models in 3, 4 or 5 drawer types; gas, oil or electric.

Address: DESPATCH OVEN COMPANY, 615 Eighth St. S. E., Minneapolis 14, Minn.



Handles rush jobs faster because space in any drawer can be used at once; no waiting for production baking to get out of the way!

Bakes thick and thin cores at same time in same or separate drawers! A time-saving feature every foundry will appreciate.

Each drawer is heat-sealed with back panel that closes oven opening when drawer is pulled out. Saves fuel, speeds baking.

Provides ample working space around oven as drawer support beam is well above workmen's heads. Saves floor space.

DESPATCH OVEN COMPANY MINNEAPOLIS 14 CHICAGO 1

In the Old Battle for New Ways
TO REDUCE PRODUCTION COSTS

. . . improved materials handling, because in the past so often neglected, probably holds greater possibilities than any other element of cost in modern production.

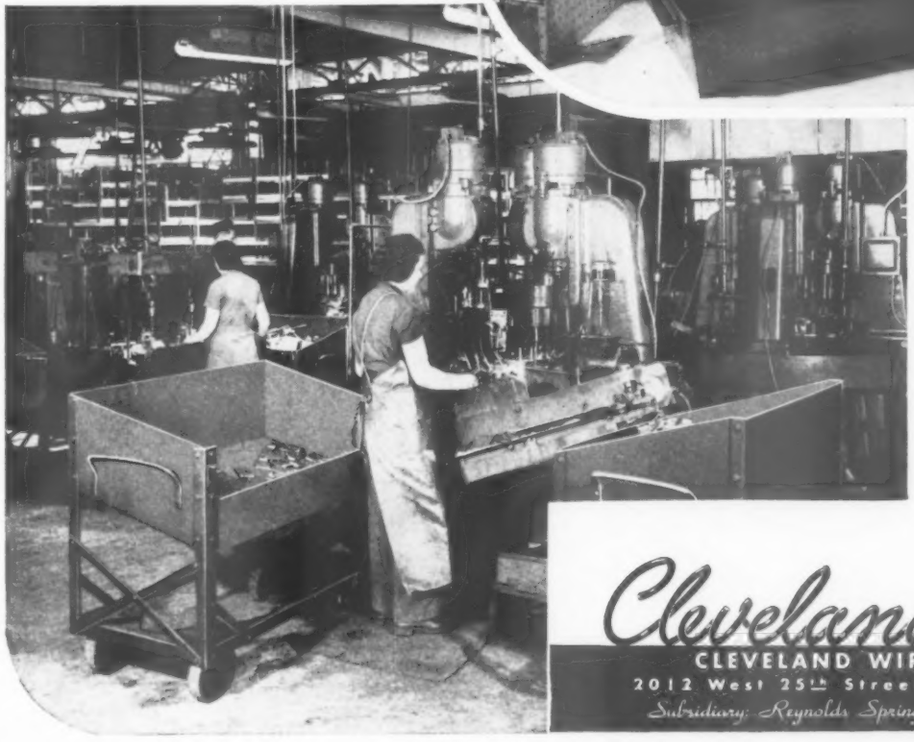
Production has aptly been called "materials in motion"—*in* machines and processing equipment, as well as *between* them and departments for finishing, packaging, storage and shipment.

This often calls for "Cleveland" shop containers and other steel equipment designed and built to fit individual needs, because the mass production of small products permits of no compromise with efficiency or fitness for their intended functions. "Cleveland" make stock as well as special sizes and models, specializing in designing and building to order to suit individual requirements.

STEEL FACTORY EQUIPMENT DIVISION
CLEVELAND WIRE SPRING COMPANY

ORIGINAL IDEAS!

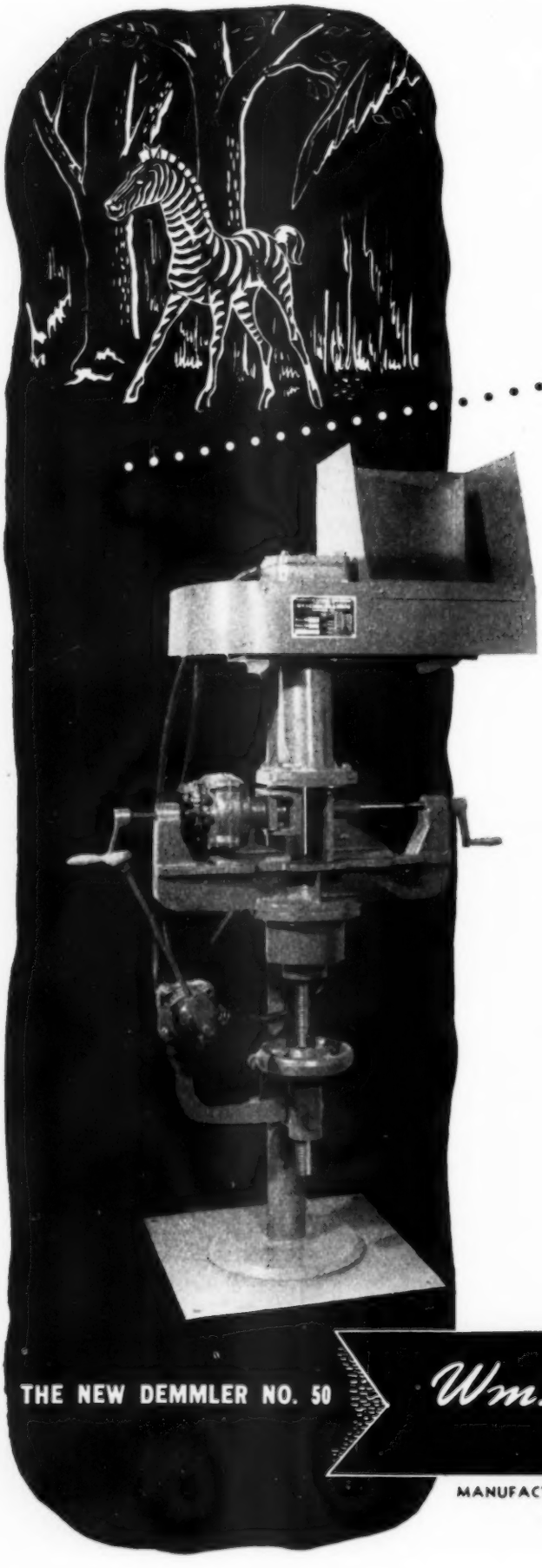
Replacing boxes of more conventional type the Soss Mfg. Co., Detroit, uses a smaller number of relatively large capacity box trucks for most efficient handling of small products, (hinges) as here illustrated. Much time is saved by elimination of repeated pickups with separate truck and restacking. Where, as in this plant, successive operations are numerous, calling for frequent moves between machines or departments in close proximity, this idea has many advantages.



ASK FOR CATALOG

of "Cleveland" steel shop boxes, barrels, stools, hand trucks, tool boxes and cabinets, racks, bins, etc. Contains many valuable suggestions.

Cleveland **STEEL SHOP EQUIPMENT**
CLEVELAND WIRE SPRING CO.
2012 West 25th Street, Cleveland 13, Ohio
Subsidiary: Reynolds Spring Company, Jackson, Mich.



ESPECIALLY ADAPTED

The zebra's stripes are perfect camouflage, making him especially adapted to the terrain in which he lives. The new DEMMLER No. 50 core blowing machine is especially adapted, too—especially adapted to short run jobs on small cores because of its quick, easy adjustments and simplicity of operation.

There is no small core blowing machine on the market today that offers so much for so little!

The DEMMLER No. 50 is a DEMMLER machine throughout—a machine you will be as proud of 10 years from now as today! It is equipped with both vertical and horizontal automatically operated air clamps. In fact, most of the important features of the large DEMMLER models are found on this reasonably priced machine.

The DEMMLER No. 50 is capable of blowing 200 cores an hour—every hour—and will easily handle cores weighing up to three pounds.

Height of the table is adjustable from 30 to 36 inches for the comfort of whoever operates it, and ANYONE can operate the DEMMLER No. 50! By means of a single hand valve, the core box is clamped and the core blown in but three seconds. No installation is necessary. Connect to an air hose and the machine is ready to use.

Here, at last, is the solution to the rapid and profitable production of small, high quality cores—the DEMMLER No. 50!

THE NEW DEMMLER NO. 50

Wm. DEMMLER & Bros
Kewanee, Illinois

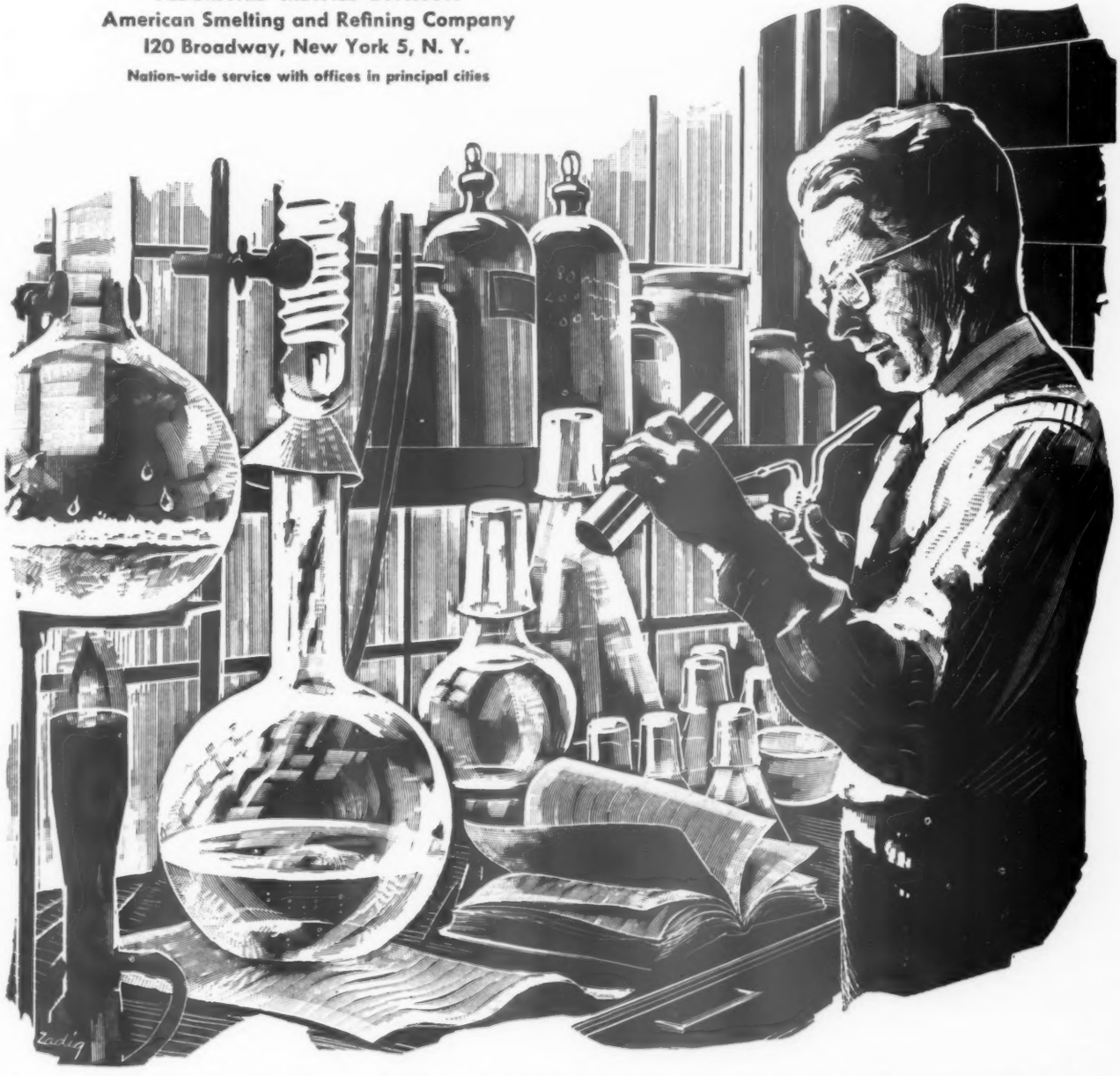
MANUFACTURERS OF CORE BLOWING EQUIPMENT EXCLUSIVELY SINCE 1911

Federated — MODERN HEADQUARTERS FOR NON-FERROUS METALS

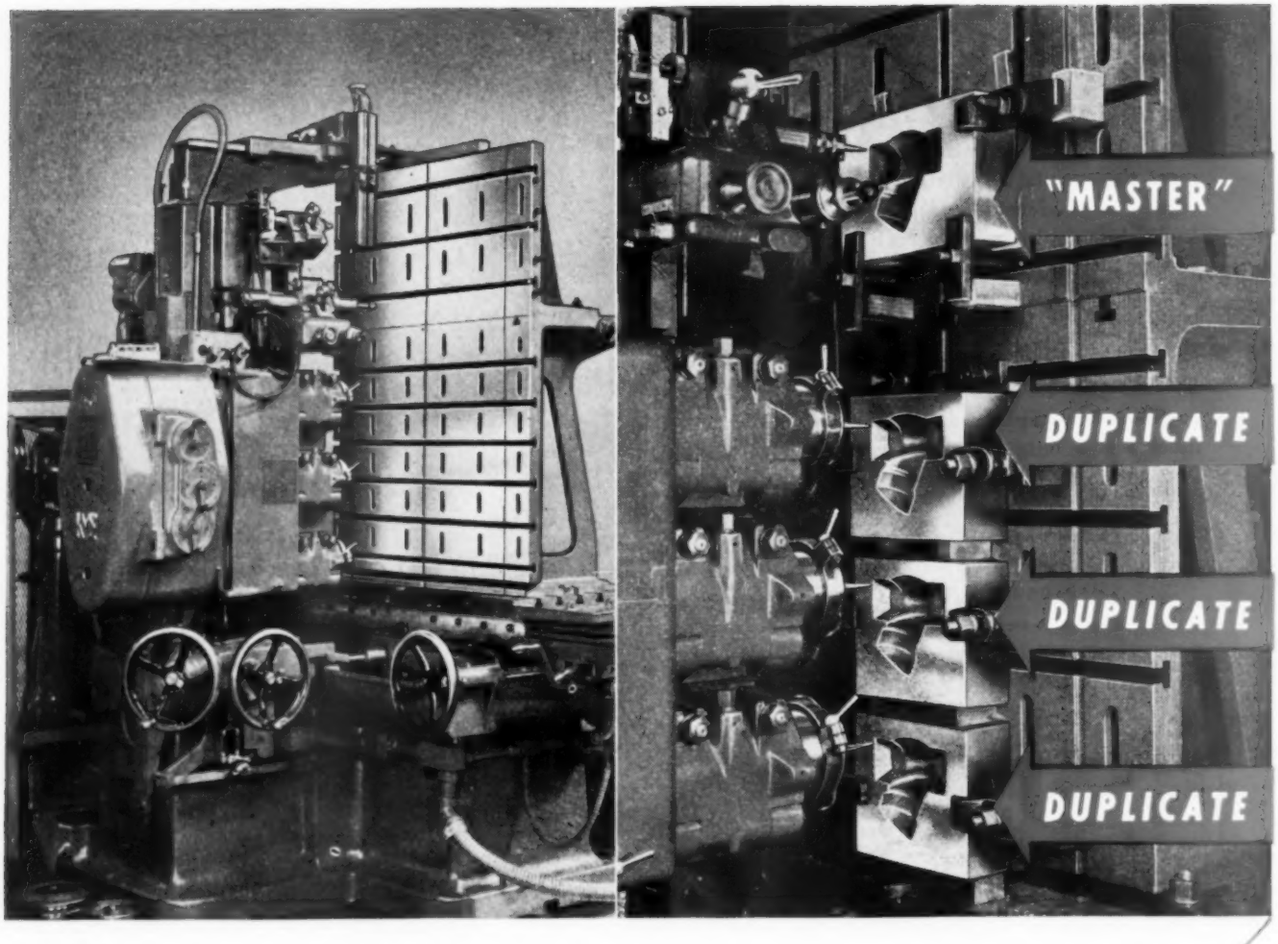
CHEMICAL CONTROL—The products of a modern smelter are engineering materials produced to meet the specific requirements of the industrial designer. In Federated, precise chemical and metallurgical control is used in each step of the smelting process. The metal is tested before it goes into the furnace, while it is in the furnace, and after it leaves the furnace—a triple check on quality and uniformity. The modern equipment used by Federated to do this job includes chemical apparatus, spectrograph, polarograph, and colorimeter. The laboratory illustrated is only one of the many we have throughout the country to serve you.

FMD Federated

FEDERATED METALS DIVISION
American Smelting and Refining Company
120 Broadway, New York 5, N. Y.
Nation-wide service with offices in principal cities



ALUMINUM • BRASS • BRONZE • BABBITT • DIE CASTING ALLOYS • SOLDER • TYPE METAL • ZINC DUST



Service Now Available

KELLER MACHINE AND PATTERN WORK

HOWARD modern facilities include two 3-spindle, automatic-type Pratt & Whitney Keller Machines which are now available for immediate service on all types of metal duplicating work.

Other **HOWARD** facilities include wood and metal production patterns, brass, bronze and gray-iron castings.

At **HOWARD**, you will find the highest type of skilled craftsmen and modern equipment — a combination that assures you of patterns and castings that are precision-engineered to fit your individual foundry requirements.
Your inquiry is invited.

No Pattern too Large or Small for our Consideration

HOWARD FOUNDRY CO.
Pattern Division
1700 N. KOSTNER AVE. CHICAGO 39, ILL.

ARMY NAVY

HOWARD

ALUMINUM BRASS BRONZE MAGNESIUM SEMI-STEEL

PATTERNS

Finishing MACHINES

Undoubtedly one of the major opportunities of today, lies in the many thousand fine tools of modern production now idle. Here at your finger tips is a choice of the world's best machine tools—the tools that won the battle of production. Now they can be purchased, at prices far below original cost. Simply tell your nearest War Assets Administration Regional Office the kind and type of machine you need, or check and mail the coupon at right. (You'll find a portion of the available equipment listed on this and the following three pages.) Remember that whenever you purchase surplus property you are not only creating new opportunities for your own business, but also helping to stabilize U. S. Post War Economy.

MAIL TODAY*

To War Assets Administration:

Please send me information on the types of Finishing Tools checked below:

Name.....Tel. No.....

Firm.....

Address.....

City.....State.....

*For War Assets Administration address, see 4th page of this advertisement.

CHECK LIST

(These key numbers correspond to the machines listed as Special Buys! Simply check those in which you are interested.)

1..... 3.....

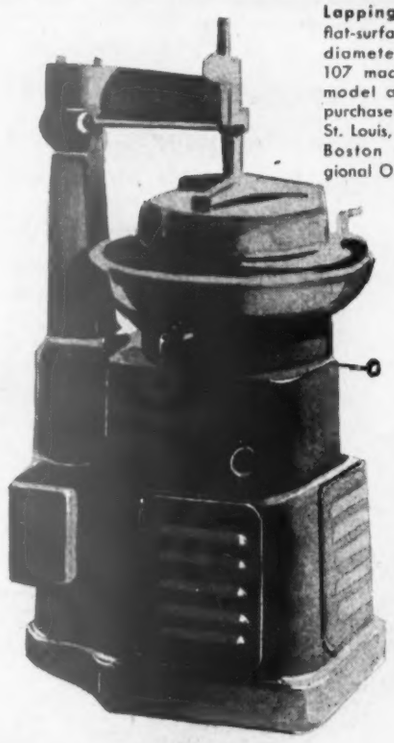
2..... 4.....

5.....

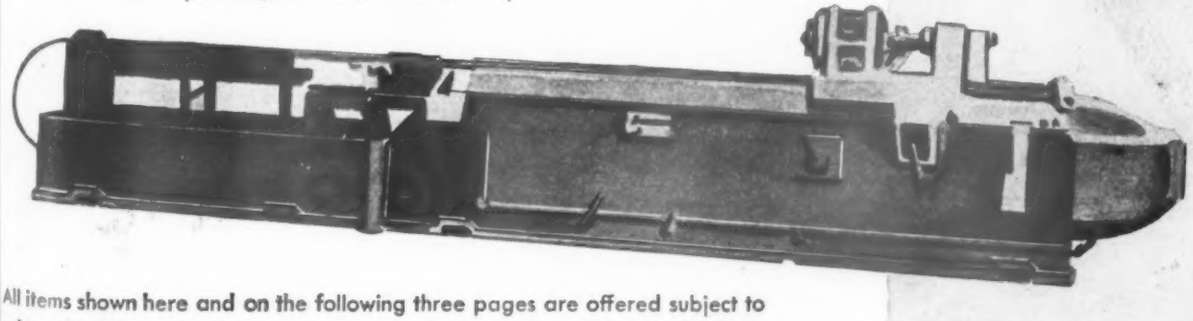
277-6

SPECIAL BUYS IN FINISHING TOOLS

KEY	MACHINE & TYPE	SIZE OR CAPACITY
1	Honing, internal, horizontal type	Under 6" Bore
2	Lapping, flat surface	24" diam. lap plate
3	Lapping, gear tooth, external	
4	Lapping, gear tooth, external and internal	
5	Honing, internal, vertical	



Lapping Machines, flat-surface type 24" diameter lap plate. 107 machines, of this model are awaiting purchase at the Detroit, St. Louis, Chicago and Boston W.A.A. Regional Offices.



Honing Machine, internal type, horizontal design. Size of bore, under 6". 175 machines similar to this one are located at warehouses in Detroit, Cleveland, Chicago and Philadelphia. Many other types also in stock are in other W.A.A. Offices.

All items shown here and on the following three pages are offered subject to prior sale. This surplus property has previously been advertised and offered to prior claimants including Veterans of World War II.

MODERN TOOLS *Speed Production*

AVAILABLE *Now* FROM GOVERNMENT-OWNED SURPLUS

American Industry is faced by its greatest production problem—that of supplying many millions of people all over the world with all the long-awaited items of comfortable peacetime living. In its prompt solution lies an important profit opportunity for individual industries.

War Assets Administration is helping to meet this problem. We are making available to industry and business billions of dollars worth of government-owned war surpluses.

By means of this 4-page advertisement, War Assets Administration is telling as large a portion of industry as possible, what kinds and quantities of machine tools are available. If you are interested, other buying information will be made available quickly. Look over the listing at right carefully. Decide which of these basic tools will help you solve immediate production problems. Then clip and mail the coupon to the nearest W.A.A. office listed at the bottom of the next page. Or if you prefer—phone your Regional Office today, and arrange a visit to inspect the equipment you want to buy.

EXPEDITING COUPON

Free Information

Check and Mail Today!

To War Assets Administration*:

Please send me specifications, prices and other information on the items listed ct right!

(To save writing simply use the key numbers shown in the left hand column of the list on opposite page.)

.....

.....

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Name.....

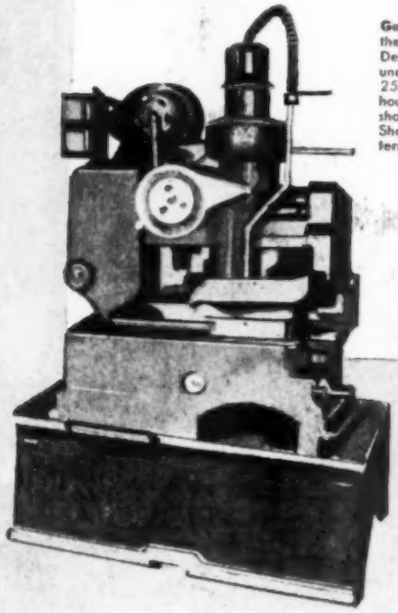
Firm.....Tel. No.....

Address.....

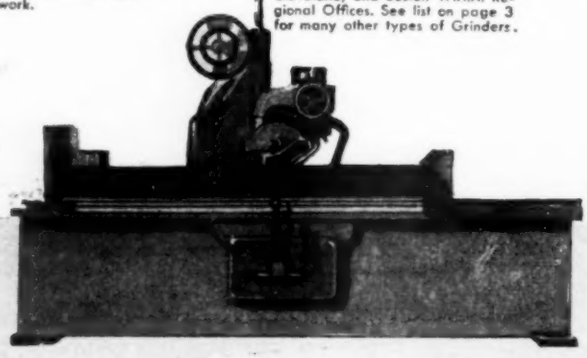
City.....State.....

**For WAA addresses see 4th page of this advertisement.*

277-6

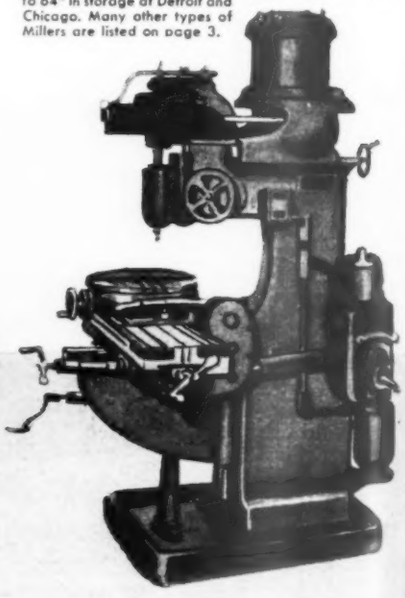


Gear Shapers are available in the W.A.A. Regional Offices at Detroit and New York in sizes under 12". Sizes from 12" to 25" in diameter are warehoused at Detroit. The model shown is a Spur and Helical Shaper for External and Internal work.



Surface Grinders. This is a reciprocating type, horizontal, split-power feed grinder. Large quantities of many sizes are available at Detroit Regional Office. Size 18" to 24" at Chicago, Boston, Cleveland, and size 24" to 48" at New York, Cleveland, and Boston W.A.A. Regional Offices. See list on page 3 for many other types of Grinders.

Standard Miller, typical of a large number of vertical spindle types. You'll find 281 with table travel under 12" at Cleveland and Detroit offices, and 147 of size 60" to 64" in storage at Detroit and Chicago. Many other types of Millers are listed on page 3.



CHECK LIST OF SPECIAL MACHINE TOOL BUYS!

Here are a few of the many hundreds of machine tools available to you through War Assets Administration.

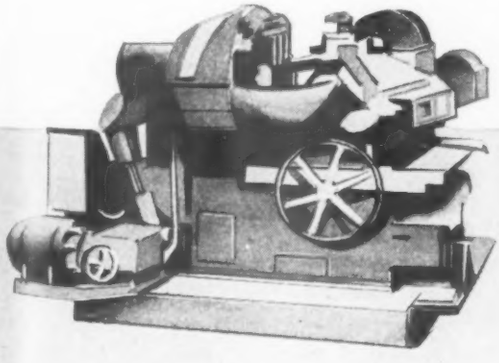
KEY	MACHINE	TYPE	SIZE OR CAPACITY
1	Boring, Drilling & Milling	Horizontal	Up to 6"
2	Boring & Turning Mills	Vertical	24" to 120" Swing
3	Boring & Turning Fixed Rail Mills	Vertical	
4	Precision Boring Machine	Horiz. bridge—single end	Under 8" to 14"
5		Horiz. bridge—double end	Under 8" to 14"
6	Drills	Sensitive Bench Box Column single spindle	Under ½" Cap. Up to 22" Swing
7			½" to 1" Cap. 16" to 24" Swing
8		Sensitive Bench Round Column—Single spindle	Under ½" Cap. Up to 22" Swing
9			½" to 1" Cap. 16" to 24" Swing
10		Sensitive Floor Box Column—1 to 6 spindle	Under ½" Cap. 12" to 22" Swing
11			½" to 1" Cap. 16" to Over 24" Swing
12			1" Cap. and over 24" Swing & over
13		Sensitive Floor Round Column 1 to 6 spindle	Under ½" Cap. 12" to 22" Swing
14			½" to 1" Cap. Under 16" to 42" Swing
15		Sensitive Floor Upright Type—Box Col. 1 to 6 spindle	Up to 28" Swing
16		Sensitive Floor Upright Type—Round Col. 1 to 6 spindle	Up to 28" Swing
17		Heavy Mfg. Type	Up to 32" Swing
18		Spec. Kingsbury Way Vertical	
19	Multi-Tool	Heavy Duty Mfg. & Production (Not automatic)	Up to 20" Swing
20	Lathe	Single Spindle—Horiz. Platen Type	
21		Single Spindle—Horiz. Turret Type	
22		Multi Spindle—Horiz. (4-5-6 & 8 spindle)	
23		Multi Spindle—Vertical (6 and 8 spindle)	
24		Auto. Between Centers Horiz. Single Spindle	All sizes
25	Screw Machine	Auto—Bar—Single Spindle	Up to 1 ½" Cap.
		Auto—Bar—5 Spindles	All sizes
26		Auto—Bar—8 Spindles	1½" and Over Cap.

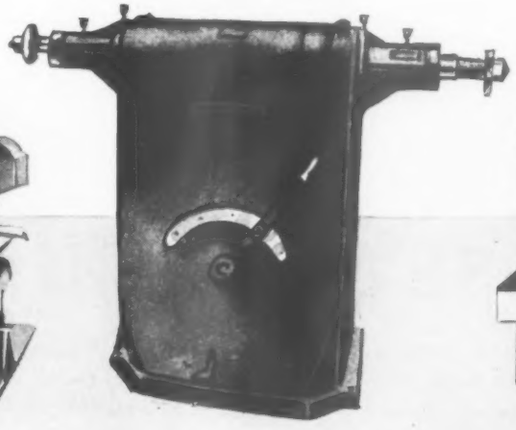
KEY	MACHINE	TYPE	SIZE OR CAPACITY
27	Miller	Horiz.—Plain—Hand Feed	10" and Over Table Travel
28		Horiz.—Plain—Knee Type	All sizes
29		Vertical—with Sliding Swivel Universal Heads	All sizes
30		Automatic	All sizes
31		Bed Type—Plain—Horiz. Spindle	All sizes
32		Vertical Spindle—Std.	All sizes
33		Vertical Fixed Bed Profiler (1 & 2 Spindle)	
34		Thread—Universal—Not Automatic	12" and over Work Diam.
35		Thread—Universal—Auto.	Up to 20" Cap.
36		Thread—Auto.—Chucking	
37		Planetary	6" to Over 10" Work Diam.
38		Spline	
39	Engravers	Pantagraph—2 Dimensions	
40	Polishers & Buffers	Floor Type	½ to 10 H.P.
41	Lathe	Speed Type	Up to 3 H.P.
42	Saws	Circular Cut-Off	
43	Lathes	Cut-Off	Under 1" Bore
44	Abrasive Machine	Belt Drum & Disc	
45	Abrasive Cut-Off		
46	Tapping	Vertical—1 & 2 Spindle	
47		Horizontal—1 Spindle	
48	Die Threading	Belt Rotary—1 Spindle	
49	Centering	Double End—Horizontal	
50	Painting, Chamfering & Burring		
51	Shaver	(Not Gear)	
52	Reamer	(Not Rifle)	
53	Drawing Machine		100,000# and over
54	Machinery & Equipment Allied to Primary Metal Forming Machine & Equipment	Pickling	All sizes
55	Gear Hobber	Horizontal	4" to 16" Cap.
56		Vertical—Universal	Under 16" Diam.
57	Flame Cutting Machine		
58	Hardness Tester	Brinell—Portable & Power	
59		Rockwell—Manual & Power	
60	Inspection Machine	Magnetic (Magnaflux)	
61	Balancing Machine	Static	
62		Dynamic	
63	Grinder	External Cylindrical—Plain	Up to 20" Swing

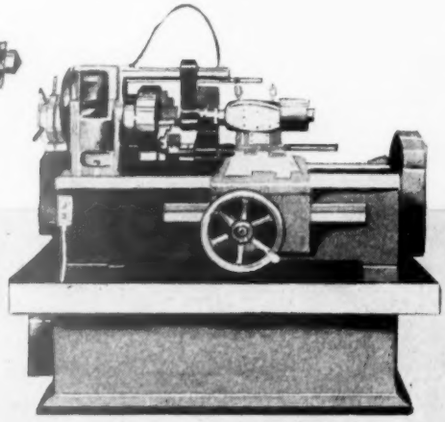
Gear Cutter Bevel. Straight tooth generators (12" shown) are now available at Detroit, New York and Philadelphia. Other sizes may be located at W.A.A. Regional Offices in Detroit, Chicago and New York.

Polishing and Buffing Machines. The heavy duty floor type shown is available in large quantities. There are 657 machines from ½ to 1 H.P. in Cleveland; 100 machines 1 to 3 H.P. in Cleveland and Detroit; 90 machines 3 to 5 H.P. in Detroit and Boston, and 633 machines, 5 to 10 H.P. or above in Detroit, Cleveland, Chicago and Boston.

Universal Thread Miller. This automatic thread miller is one of the many types and sizes now available for purchase at W.A.A. Regional Offices in Detroit, Boston, Chicago, Cleveland. Check list above for detailed information on other types of milling tools.







FREE INFORMATION

To War Assets Administration:

Without obligation please send me detailed information on the following machine tools:

.....

.....

(Write in any type of machine tool you need.)

Name.....Tel. No.....

Firm.....

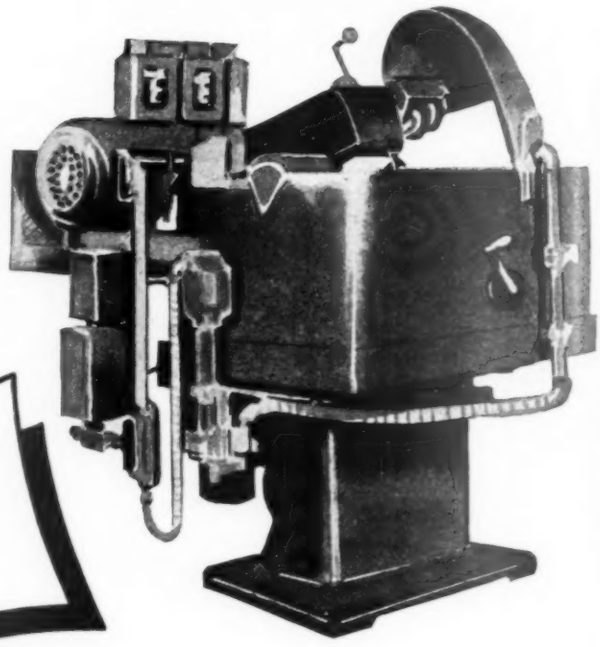
Address.....

City.....State.....

277-6

ABRASIVE CUT-OFFS

Abrasive Cut-off Machine. For this and all other machine tools shown in these four pages, simply contact your nearest W.A.A. Regional Office listed below. Each of these offices can give you information about present inventories of machine tools . . . or better yet mail the coupon at left. 112 abrasive cut-off machines are available now and more will be declared surplus.



VETERANS OF WORLD WAR II

—to help you in purchasing surplus property, Veterans' units have been established in each War Assets Administration Regional Office.

GOVERNMENT-OWNED SURPLUS PRODUCTION EQUIPMENT

The machine tools shown on this and the preceding three pages, produced a steady flow of equipment during the war. Now that their job is done they are ready for application to civilian production needs. Huge quantities of all models and types are available—so many that they simply couldn't be completely listed on these few pages. For you these machines spell opportunity to reequip your plant for postwar markets quickly and at low cost. Certainly it costs little to investigate. Simply circle the item or items listed on this and preceding pages—clip out the coupons and mail today.

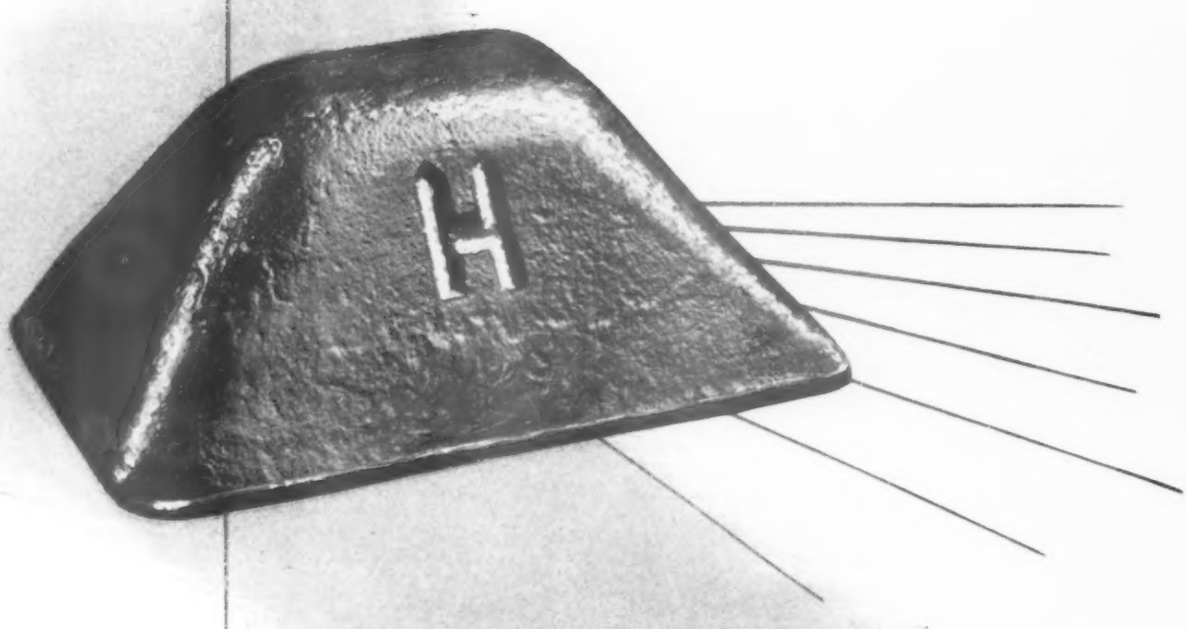
TAPPING MACHINES

Tapping Machines. Over 400 of the one spindle, vertical type are waiting for purchase in Detroit, Chicago, Boston and Philadelphia warehouses. Two spindle models, (not shown) may be inspected at warehouses of either the Cleveland or Boston W.A.A. Regional Offices. 259 horizontal one spindle machines are being sold at Birmingham, Detroit, Cleveland, Chicago, and Philadelphia Regional Offices.

WAR ASSETS ADMINISTRATION

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane

HANNATEN IRON INGOT



A 10 pound reason for using Hanna Iron...

HannaTen iron ingots provide foundrymen with a better iron for better castings. Their convenient 10 pound size assures more accurate control of the charge . . . a more uniform melt . . . greater flexibility in foundry operations. At the same time, the finer grain structure of HannaTen ingots yields inherently finer-grained castings. Available in five grades, HannaTen costs no more than regular Hanna pig. Write or phone the nearest Hanna office for details today.

THE HANNA FURNACE CORPORATION

BUFFALO • DETROIT • NEW YORK • PHILADELPHIA • BOSTON

MERCHANT PIG IRON DIVISION OF NATIONAL STEEL CORPORATION

The NEW MIRACLE uni-flux

The Universal METAL PURIFIER

- *Miracle Purifier* UNI-FLUX GIVES BETTER QUALITY AND LESS *WASTE*...SIMPLE TO USE...
  FOR ALUMINUM
  FOR BRASS
  FOR COPPER
  FOR GREY IRON

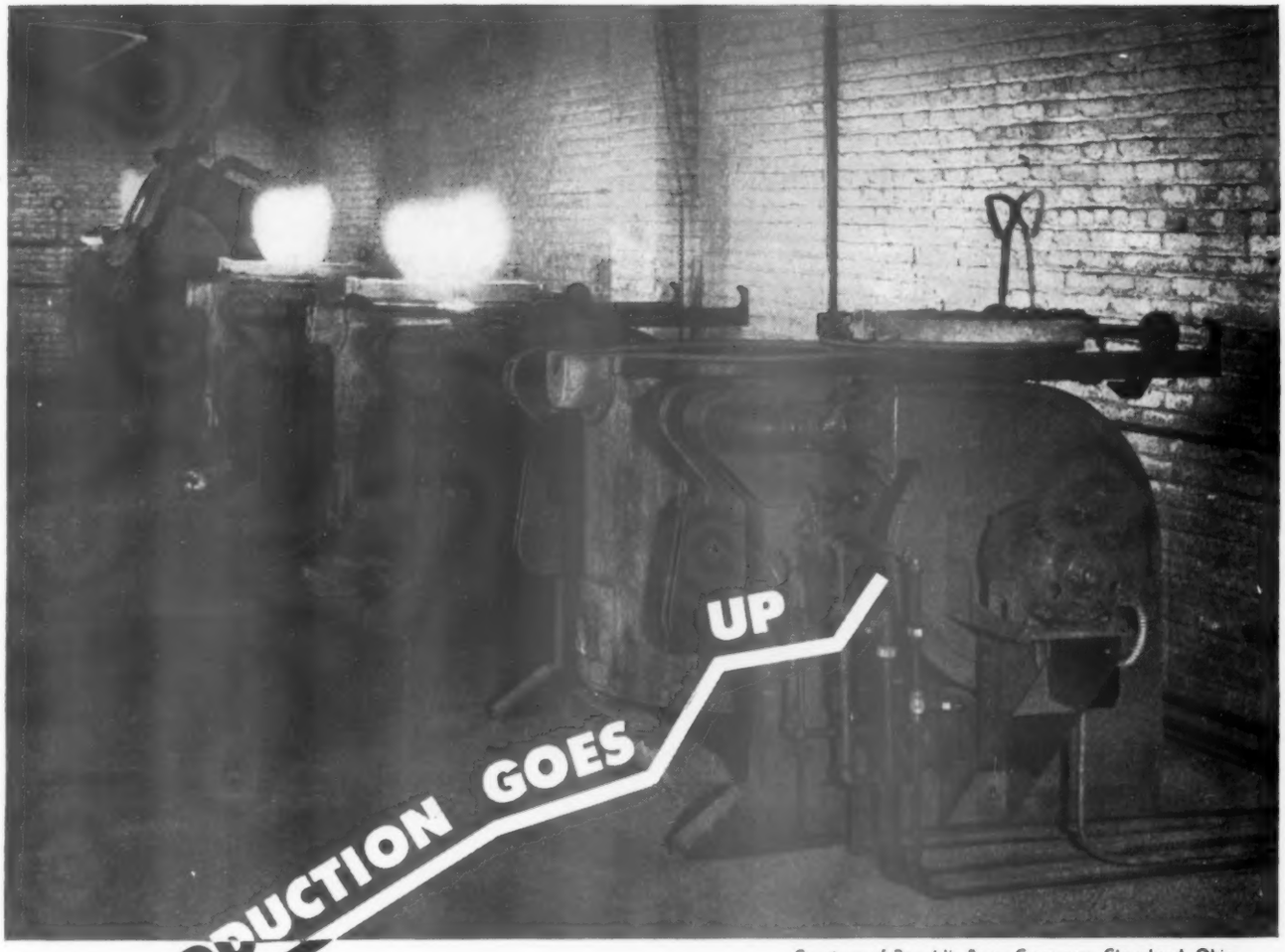
- FOR ECONOMY AND UNIFORMITY UNI-FLUX WILL DO THE JOB. GOES TWICE AS FAR AND PURIFIES METAL BETTER.

- WE WELCOME INQUIRY, WRITE US FOR LITERATURE - DEPARTMENT 2-A

★ *IMMEDIATE DELIVERIES*

UNITED FLUX CORPORATION

7014 EUCLID AVE. CLEVELAND, OHIO



Courtesy of Republic Brass Company, Cleveland, Ohio

WHEN YOU INSTALL "FISHERS"

Because:

1. Shut-down time, for repairs, is greatly reduced by the "sealed-in" burners used in "Fishers", which prevent excess air from eating away red hot refractories and crucibles.
2. Better metal is produced and refractory life increased in "Fishers"—by assurance of correct melting time.
3. Only *foundry-proven* features are incorporated in "Fishers" —Fisher has long led the field in furnace development.
4. Proper control of furnace atmosphere is a feature in "Fishers"—insured by the employment of the *time-proven* principle of multiple burners with appropriate mixing equipment.
5. Since 1906—highest quality of metal, extreme fuel economy and noteworthy labor savings have been characteristics of all "Fishers."

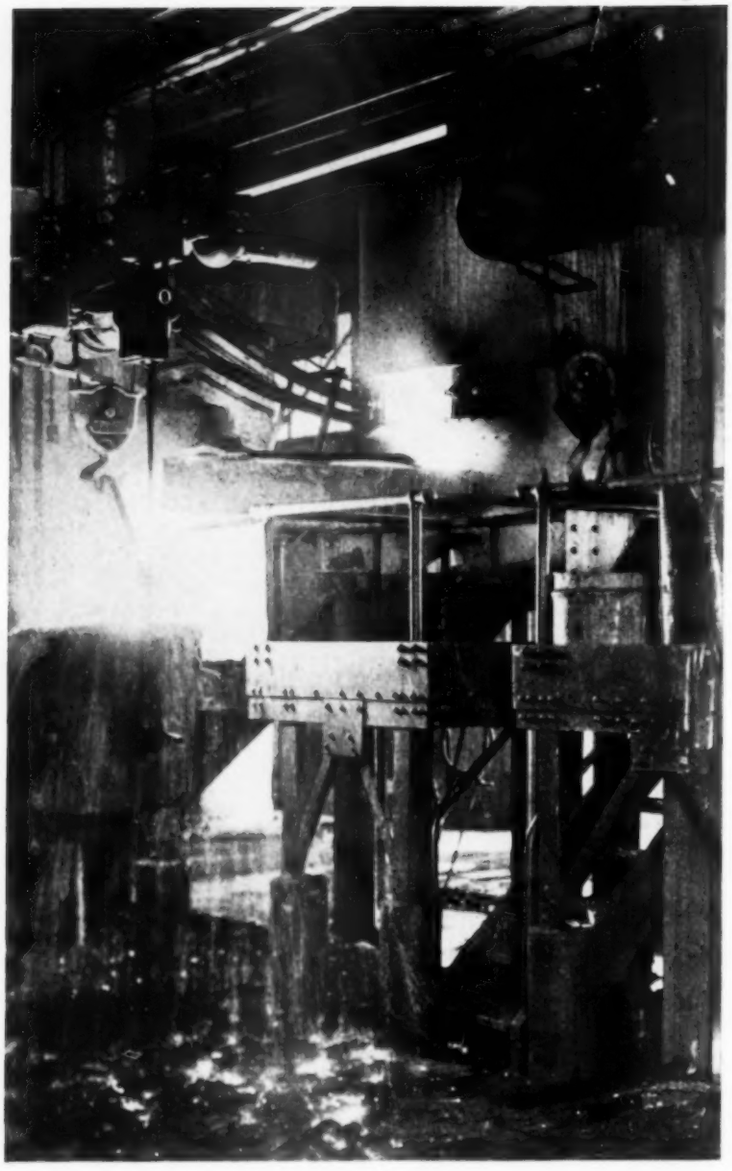
Fisher has published a well illustrated and fully descriptive Bulletin on every piece of Fisher equipment offering a wide selection of all types and capacities of non-ferrous metal melting furnaces, blowers and accessories—ask for your copies.

5519 N. Wolcott Avenue, Chicago 40, Illinois

Fisher FURNACE COMPANY

Engineers and Manufacturers

IRONTON CARO-LINE



THE SILICEOUS RAMMING REFRACTORY FOR GRAY IRON MALLEABLE AND STEEL FOUNDRIES

"Ironton Caro-Line" Siliceous Ramming Refractory is now being used successfully in gray iron and malleable foundries, for ladle linings and for rammed in breasts and slag holes. It gives from 3 to 5 times more service than ordinary ladle lining materials.

It is highly refractory, has unusual resistance to metallic oxides, gives cleaner iron and reduces the loss of castings due to slag inclusions. It is easy to install and your operators will like it.

May we send one of our service men to tell you about this refractory material?

THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON OHIO

Always at Your Elbow

A MAN WHO THRIVES ON TROUBLE

When you're having foundry trouble—no matter what the cause—your best bet is to do the same thing that hundreds of other foundrymen have done—call the Republic Pig Iron Metallurgist.

A combination background of practical foundry experience and skilled metallurgical training usually enables the Republic Pig Iron Metallurgist to dig up the cause of your trouble in a hurry. And seldom is the case when he is unable to suggest the proper remedy with equal speed and efficiency.

Many foundrymen, too, have discovered that you don't have to be having trouble to profit from a visit by the Republic Pig Iron Metallurgist. Just a routine operational survey often uncovers new and profitable methods for increasing productive output without increasing overhead costs.

You place yourself under no obligation when you call for a Republic Pig Iron Metallurgist. The only obligation is his, and that is to help you. Just let us know when you would like him to see you.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic PIG IRON

"CHATEAUGAY" Low Phosphorus, Copper Free

"REPUBLIC" Northern Foundry, Basic and Malleable

"PIONEER" Southern Foundry and Basic

ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC COKE WIRE • FOUNDRY NAILS

ENGINEERING ABILITY

BACKED BY 30 YEARS OF EXPERIENCE

DSM

DETROIT SHEET METAL WORKS
DETROIT, MICH. U.S.A.

EXPERIENCE and ability acquired in thousands of installations are at your service when selecting D. S. M. equipment.

D. S. M. case histories have been derived from equipment furnished to plants throughout U. S. A. and to Dagenham, England; Clichy, France; Bombay, India; Batavia, D. E. I.; Sao Paula, S. A.; Turin, Italy; etc. D. S. M. equipment means rapid cross flow circulation for speedy and uniform drying or baking. This eliminates case hardened products.

If you wish to convert your present system to the new postwar economy, it will be to your advantage to try our Go-Out Plan. This means that you will enjoy the services of our highly experienced engineers, who will personally inspect your system and work together with the various departments in your plant in need of special help. Their recommendations for whatever new installations may be required will place you in a position to secure a layout that will more than justify your outlay.

DETROIT SHEET METAL WORKS, 1270 OAKMAN BLVD., DETROIT 6, MICHIGAN

PLANT ENGINEERING: *Consulting assistance in plant layout to coordinate departmental operations, our experience dated from 1917 in this field.*

Such plant layout may be based on increasing production beyond present capacity, or it may be a rearrangement in this post-war period when operations are conducted under a new set of conditions.

MOTOR CLEANING EQUIPMENT: *Washing machines for cleaning tear-downs. Kerosene spray or similar solvent usually used as the cleaning medium.*

FORMED COWLINGS, PANELS, ETC.: *To your specifications, and of light metal alloys as required. Weldments and brazed assemblies may be under controlled atmosphere.*

PILOT EQUIPMENT: *Sample size equipment for development of heavy equipment.*

VERTICAL CORE BAKING OVENS • CONTINUOUS HORIZONTAL BAKING OVENS • BATCH TYPE CABINET OVENS • DRAWER OVENS

DETROIT SHEET METAL WORKS

DETROIT - 6 - MICHIGAN

STERLING PATENTED FEATURES

1. Solid rolled flanges with full-width bearing.
2. Sturdy all-steel webs of ¼" or ⅜" thickness.
3. Solid center reinforcing bars to prevent distortion.

(Patent No. 1974292)

STYLE ⅜ NT-NNT FLASK — 36" x 48" x 14" x 10". Equipped with heavy duty malleable clamps and steel clamping bars.

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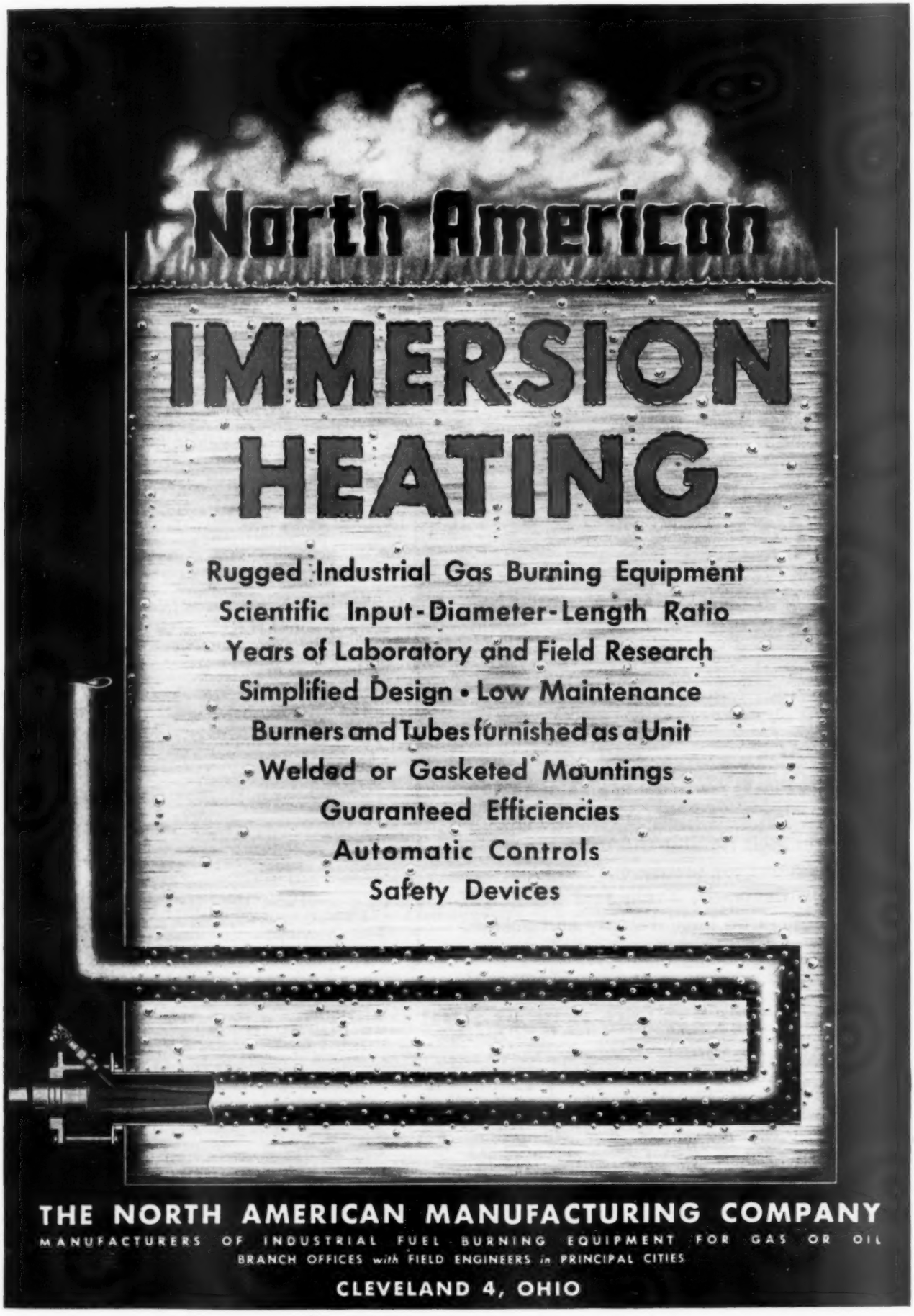
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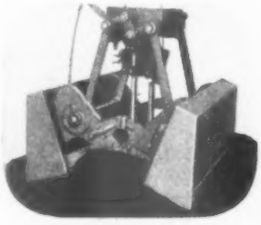
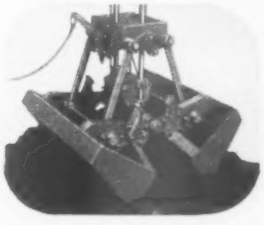
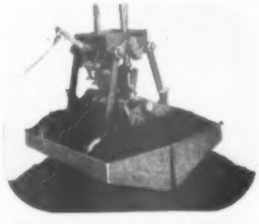


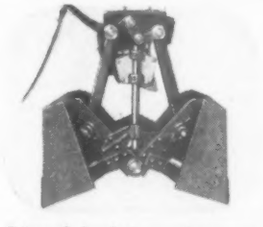
In position ready to dig.



Equalized closing action.



Bucket closes before it lifts.



Tripped, bucket remains open.

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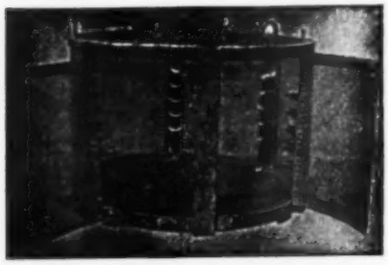

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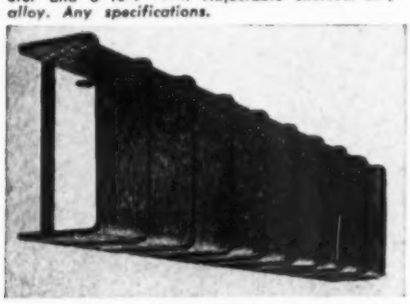

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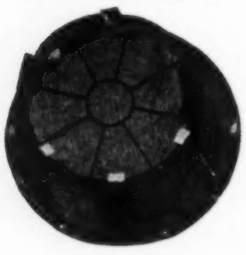

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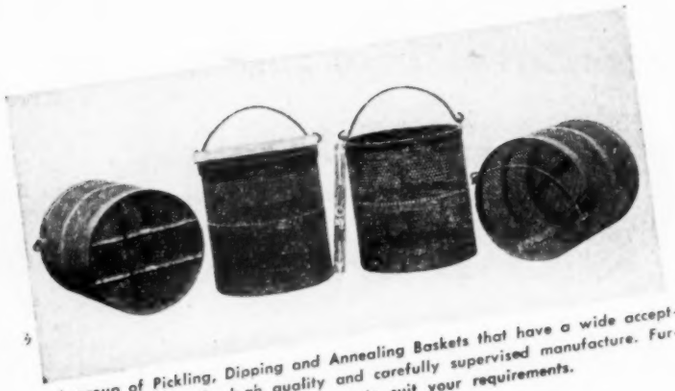

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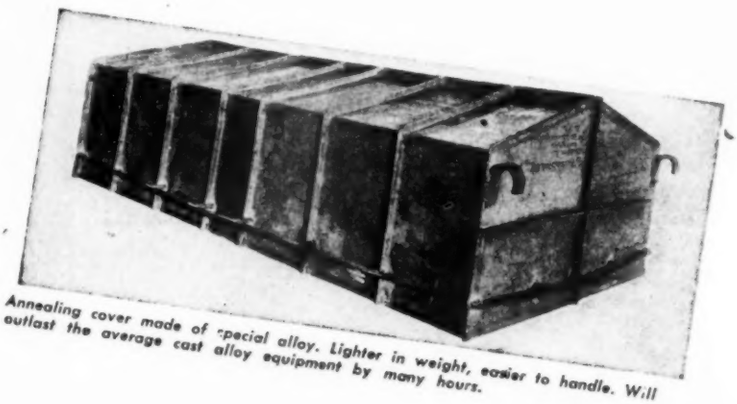

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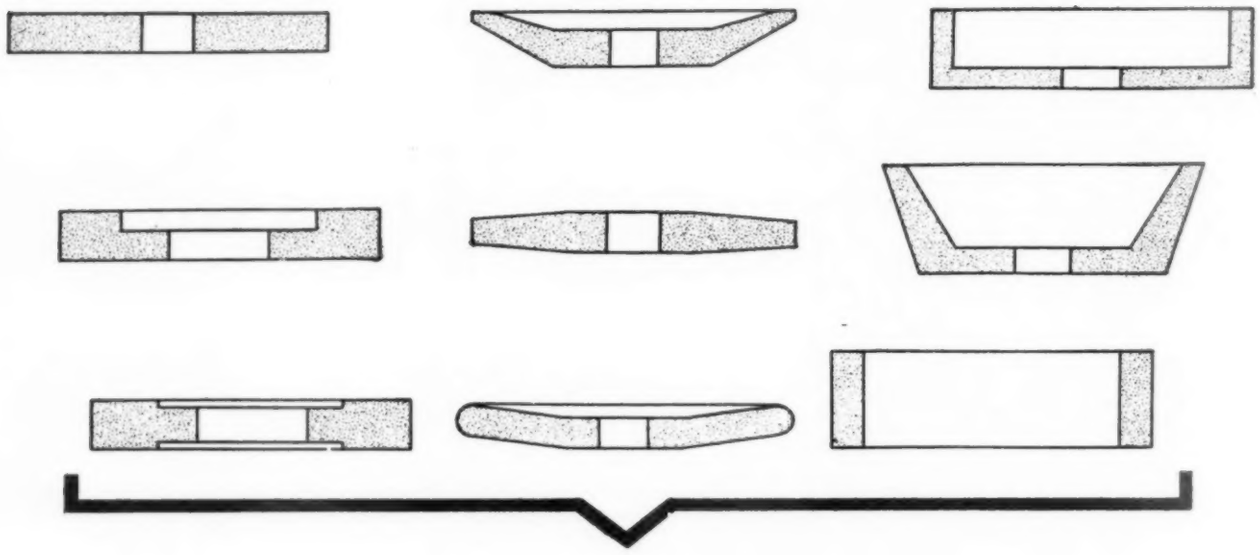

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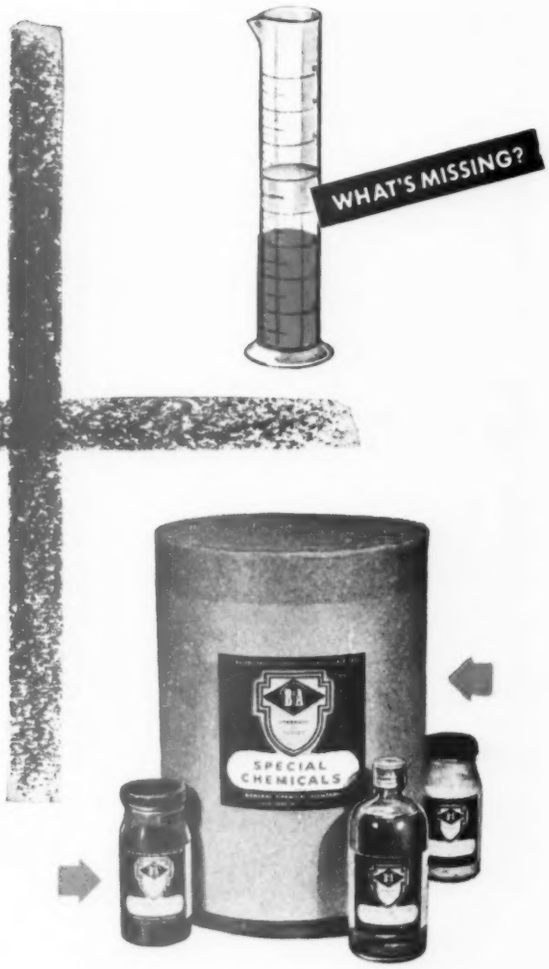

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IF FOUNDRYMEN have any lingering doubts about the essentiality of castings to a national economy devoted either to war or to peace, the frequent flurries in Washington occasioned by ever occurring emergencies in materials should prove most convincing. Whenever engineering materials are short, government doctors issue prescriptions promising immediate cures for every situation. The most recent example of governmental doctoring is entitled "Direction 13 to the Steel Preference Order (M-21)," which, the doctors state, has been developed to increase production of cast products for veterans' housing projects, certain items of farm equipment, and railway brake shoes. The new order, issued by the Civilian Production Administration, permits manufacturers of a list of products to certify by letter direct to foundries that certain orders for castings will be used in the production of these critical items, and these "certified orders" must be considered as rated orders by foundries during the months of August and September.

There can be no quarrel with an effort to provide sufficient farm machinery to harvest this year's crops, although it does seem rather late in the 1946 season to be putting pressure in that direction. In the matter of GI housing, foundrymen are most anxious that the government program has a supply of cast iron pipe, radiation, furnaces, bathtubs, sinks, and various types of fittings in balance with the supply of lumber and other materials required for the housing program.

Nevertheless, the type of "certified" rating which has been ordered by CPA has a tendency to upset the entire reconversion program, as far as procurement of ferrous castings is concerned. Undoubtedly, production of automobiles, many household appliances, and other types of durable and consumer goods will be delayed while pig iron is diverted to farm equipment and housing programs. When considered either from the viewpoint of preventing inflation through increased production, or from the standpoint of supplying jobs for returned servicemen, it is most difficult to evaluate the relative importance of the various classes of castings.

In approaching the problem of increasing production of these certain products which are built chiefly of castings, the CPA has operated on a false premise. The foundry industry, as well as the entire steel industry, is terribly short on pig iron and scrap. Instead of being satisfied with an unequal distribution of pig iron, which benefits certain types of products while penalizing the bulk of the foundry industry, the CPA and government agencies should be concerned with increasing pig iron production and in developing a greater supply of scrap suitable for foundry use. If scrap cannot be procured domestically in sufficient tonnage, efforts should be made to bring back battlefield scrap, a natural resource which at present is not being returned because of cost factors. Since subsidies have been provided rather freely, especially in connection with agricultural products, the same remedy might be applied to such scrap in order that the farmer may have the tools for the planting as well as the harvest.

The nation is just beginning to suffer for the sins of a government that permitted prolonged strikes in steel and coal.

Frank G. Steinebach
Editor

HEAT TREATMENT

This paper, concerned chiefly with problems arising in attempts to harden heavy cast steel sections completely, is based on work done for the Office of Scientific Research and Development under Contract OEMsr-450 with Battelle Memorial Institute

By PHILIP C. ROSENTHAL and G. K. MANNING
Assistant Supervisors
Battelle Memorial Institute, Columbus, O.

PRIOR to the war, heavy cast steel sections, of say 6 in. or more in thickness, were commonly used only in the as-cast or in the as-annealed condition. Such castings possessed fairly good ductility but rather low tensile and yield strengths. During the war, limitations of weight and the concurrent increase in unit stresses made it necessary to consider the use of quench and draw treatments for heavy castings as a means of obtaining an increase in the hardness, tensile strength and yield strength without loss of toughness and ductility.

Drawn martensite has been proved, at least for medium and low-carbon steels, to give the best combination of strength and ductility. For a given tensile strength or yield strength, the elongation or reduction of area of tempered martensite is superior to the elongation or reduction of area that can be obtained from a structure consisting of either pearlite or bainite or mixtures of these two transformation products. Conversely, for a given elongation or reduction of area, the tensile strength or the yield strength that can be obtained from tempered martensite is greater than that which can be obtained from either pearlite or bainite.

In some instances, it is sufficient that heavy sections have only an exterior shell that is fully hardened. Interior portions of these castings may, with-

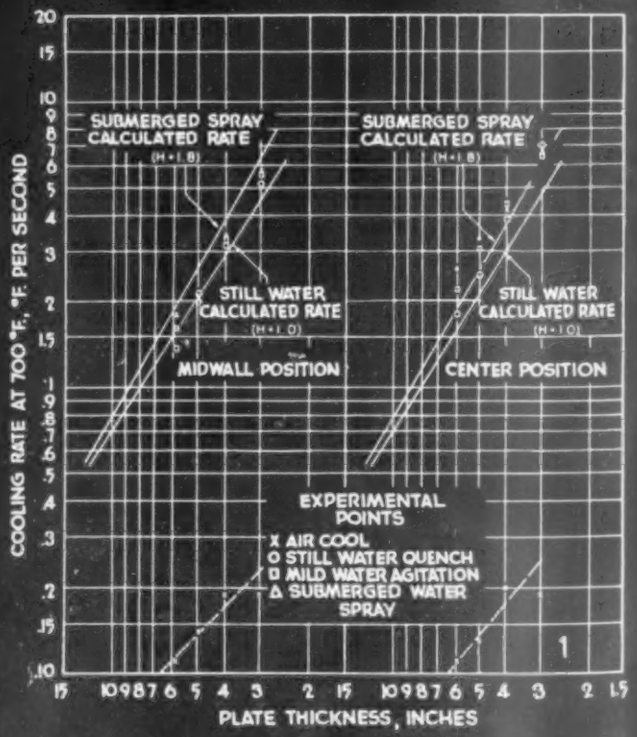

SUBMERGED SPRAY CALCULATED RATE (H=1.8)
STILL WATER CALCULATED RATE (H=1.0)
MIDWALL POSITION
SUBMERGED SPRAY CALCULATED RATE (H=1.8)
STILL WATER CALCULATED RATE (H=1.0)
CENTER POSITION
EXPERIMENTAL POINTS
X AIR COOL
O STILL WATER QUENCH
□ MILD WATER AGITATION
Δ SUBMERGED WATER SPRAY
COOLING RATE AT 700 °F., °F. PER SECOND
PLATE THICKNESS, INCHES

Fig. 1—Experimental and calculated cooling rates at center and midwall position of plates 3 to 6 in. thick at 700 F

Fig. 2—Similar cooling rates at 1000 F. Cooling rate at center of 6-in. plate is more than ten times faster during water quenching than during air cooling

Fig. 3—Cooling rates of plates at 1300 F

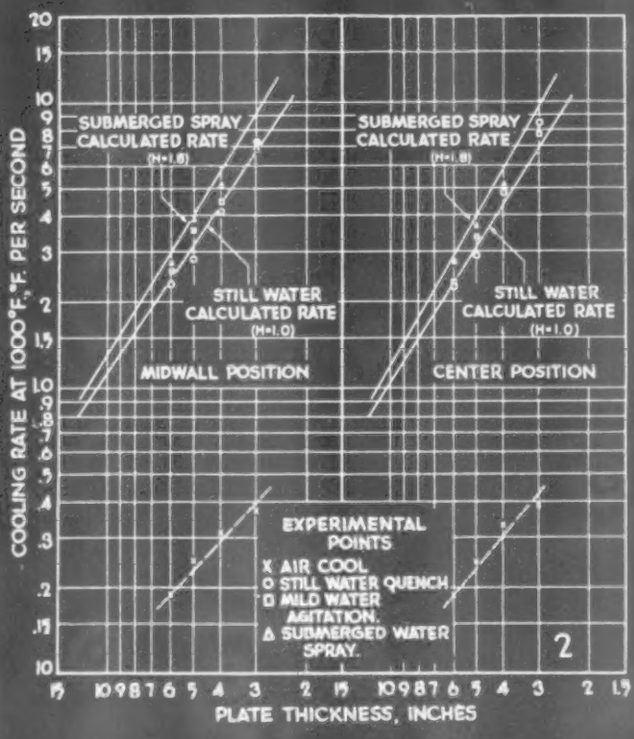
out detriment, be mixtures of higher temperature transformation products, i.e., bainite, ferrite, and pearlite. This is true for parts where high stress occurs only at or very near the surface, and it becomes simply a matter of saving the surface and saving all. The problems of heat treating such massive castings, which demand only a shell of martensite at the exterior, are very similar to the problems of fully hardened lighter sections.

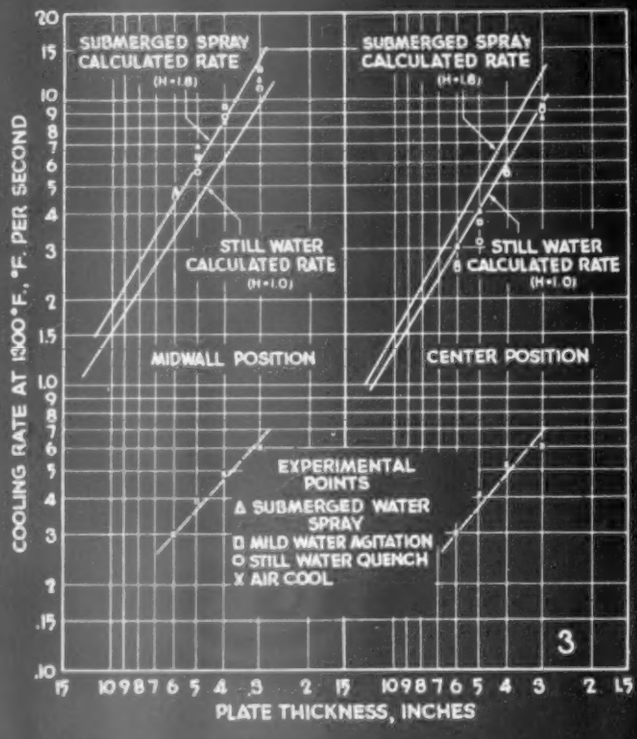
In other heavy sections, it can be demonstrated that only fully hardened and drawn parts will result in the optimum service life. In these parts, service conditions are such that the triaxial stresses imposed well below the surface produce nearly as severe a condition as the biaxial stresses that occur at and near the surface. For example, highly stressed shafting which is subject to both a severe torque and a severe bending moment may, if hardened only at the surface, fail in such a way as to indicate that the fracture originated well below the tempered martensite zone and within the incompletely hardened area. If such parts are hardened throughout and then tempered, improved life results. The complete hardening from surface to center of such heavy parts imposes problems which are not commonly encountered in lighter parts. The present paper is chiefly concerned with the problems which arise in attempting to harden heavy sections completely.

Heating and Cooling Rates of Heavy Plate: One of the early questions that arose was whether it was worth while to attempt to water quench sections of 6-in. thickness or more. Water quenching produces severe stress near the surface, and if at the center air cooling results in almost as rapid a cooling rate as water quenching, then it might be advantageous simply to adjust the alloy content so that air cooling would produce complete hardness and thus avoid the high stresses set up near the surface and the corners during water quenching. The cooling rates at the center and midwall (halfway between the center and surface) position of plate of 3 to 6-in. thickness were obtained experimentally and are indicated in Figs. 1, 2 and 3. These experimental rates were compared with rates calculated from data published by Austin and originally determined by Russell.[1]

First it may be noted that the experimental and calculated cooling rates agree quite well. Second, a large difference in cooling rate exists between the center cooling rate of heavy plates that are air cooled and water quenched. For example, at 1000 F the cooling rate at the center of 6-in. thick plate is more than 10 times faster during water quenching than it is during air cooling. Third, it is evident that

# of heavy cast steel sections





there is only a small difference between the rate of cooling in the midwall position and the rate of cooling in the center position on heavy plates that are water quenched.

The heating cycles of these same plates were determined and are shown in Fig. 4. Heating was carried out in a large electric furnace with the furnace equalized at 1650 F before introducing the plate. The power input of the furnace was sufficient that the furnace atmosphere, as indicated by the furnace thermocouple, came back to 2650 F within a few minutes after introduction of the plate into the furnace. The results indicated a considerably faster rate of heating than is suggested by the old rule of thumb that one should heat heavy sections one hour for every inch of thickness. The results also indicate that there is only a minor temperature gradient between the surface and the center of the plate. Even in the 6-in. block, this was not more than 150 F at any particular time during the heating cycle.

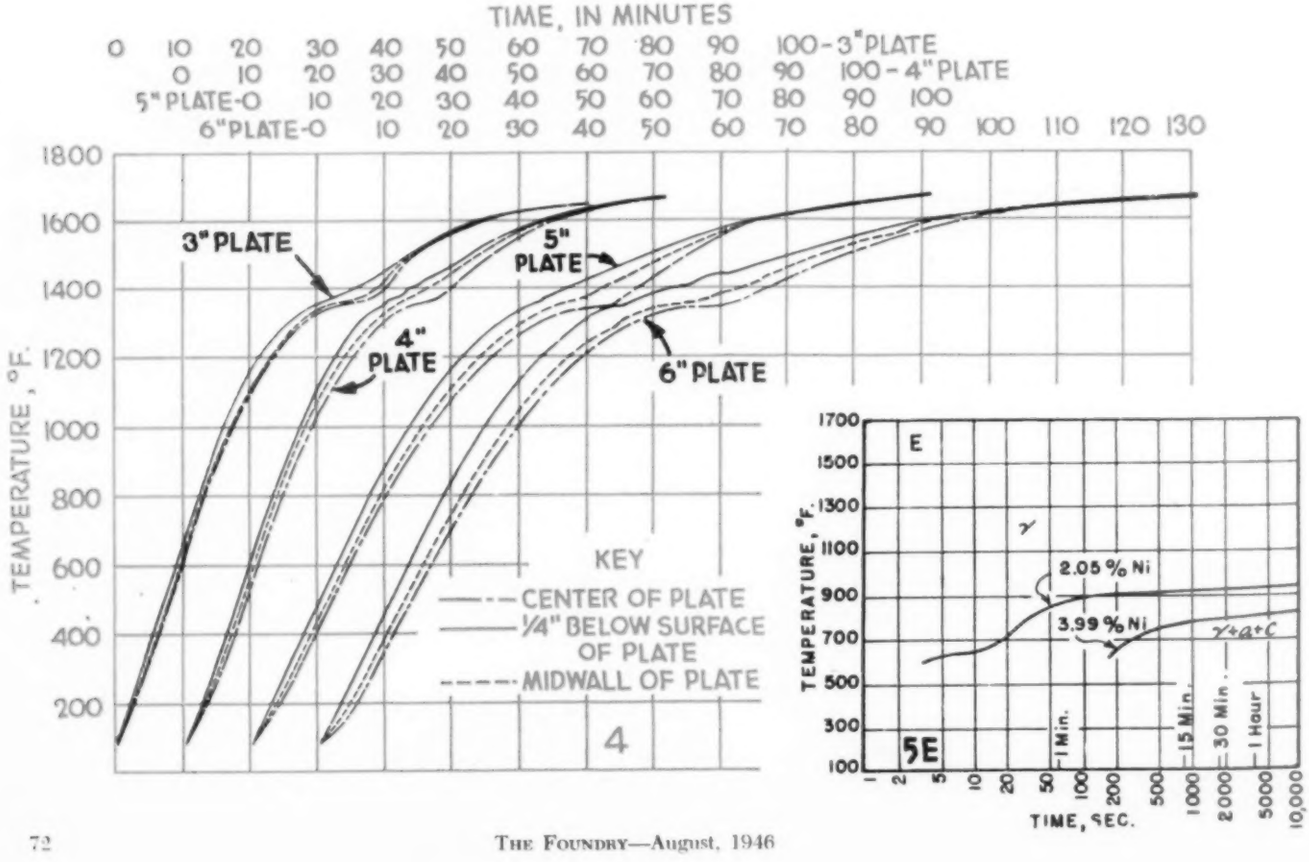
Hardenability Tests: The lowest cooling rate obtainable in the standard end-quench hardenability bar is about 4 F per second at 1300 F. From Fig. 3, it is apparent that the standard end-quench hardenability bar is incapable of producing data that can be directly applied to plate thicknesses greater than about 5 in. In an attempt to overcome the handicap of not being able to measure hardenability as it pertains to these heavy sections, a hardenability specimen was devised to cover the range of cooling rates beyond the limits of the standard end-quench bar. The method of constructing this special hardenability bar is indicated in Fig. 6, and the cooling rates obtained on such a bar are indicated in Fig. 7. Thus, with the lowest cooling in the standard end-quench bar being about 4° per second at 1300 F, the special hardenability bar ranged from about 5° to 1° per second at 1300 F.

The utility of this air-cooled hardenability test was not so great as originally anticipated. When twenty steels of high-alloy content were tested, not one changed more than 2 points Rockwell C between the slow-cooled and the fast-cooled end of the test bar, and only one steel exhibited a conspicuous change in microstructure within the length of the bar. It appeared from these results that, if the hardenability of the steel was high enough to give practically a horizontal line after the standard end-quench test, it was also sufficient, for practical purposes, to give complete hardening at cooling rates as low as 1 F. The microstructures of the special air-cooled hardenability bar were examined to locate the approximate position where non-martensitic transformation products began to form. Such a rating proved to be rather inaccurate because of the difficulty of distinguishing between martensite and low-temperature bainite. It was found that more useful information could be obtained from the isothermal transformation diagrams of the steels.

Isothermal Diagrams: A study of the effect of chromium, manganese, molybdenum, and nickel on the beginning isothermal transformation of several heavily alloyed steels was made. Fig. 5 indicates that the generous use of alloys leads to a ready suppression of transformation within the pearlitic range, but is much less effective in suppressing transformation within the bainitic range. It is characteristic of alloying elements in general that they affect the pearlitic range of transformation to a greater extent than they affect the bainitic range.

Carbon, on the other hand, affects transformation within the bainitic range to a much greater extent than it

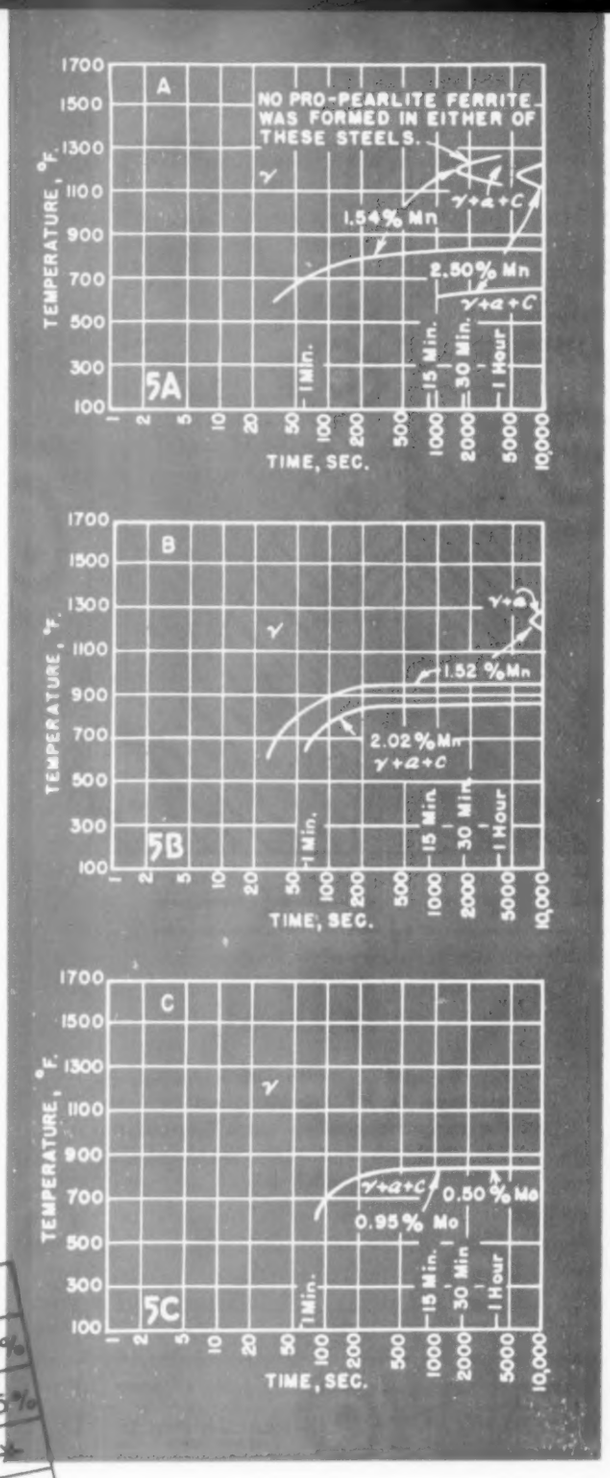
Fig. 4—Heating curves for 3, 4, 5 and 6-in. plates



affects transformation within the pearlitic range, and the curves shown in Fig. 5 would be greatly changed by increasing the carbon content as much as 0.10 to 0.15 per cent. However, such an increase in carbon content would greatly increase the quench-crack susceptibility of the steel, and for this reason it is generally not feasible to attempt to obtain more complete hardening by use of greater amounts of carbon. Fig. 5 indicates that use of manganese and nickel in increasing amounts does tend to retard beginning bainitic transformation, and that manganese is perhaps three or four times as effective as nickel in this respect on a percentage basis.

Work by Griffiths, Pfeil, and Allen[2] has indicated that chromium also has an effect on beginning bainitic transformation to an extent that is intermediate between the effect of manganese and the effect of nickel noted previously. The isothermal tests made on the two steels having 0.50 per cent molybdenum and 0.95 per cent molybdenum but of the same base analysis were unique in that increasing the molybdenum con'ent had no apparent effect on the beginning of bainitic transformation.

Factors Limiting Useful Amount of Alloy: From the considerations so far discussed, it would appear that by simply adding generous amounts of alloy, a composition of sufficient hardenability to be suitable for any given section could eventually be reached. However, there are several factors which tend to limit the amount of alloy that may be used to advantage. First, as the amount of alloy is increased, the tendency of the steel to crack during quenching is increased. Quench cracking is probably more closely associated with the temperature of the martensitic transformation range than it is with any other characteristic of the steel. The higher the martensitic transformation temperature, the less is the quench-crack-



ALLOY BASE ANALYSES

Fig.	C	Mn	Ni	Cr	Mo
A	.30%	*	.97%	2.05%	.43%
B	.30%	*	1.11%	.66%	.55%
C	.33%	1.49%	2.07%	.67%	*
D	.31%	2.02%	*	.66%	.55%
E	.25%	1.49%	*	.69%	.54%

* AS INDICATED ON THE DIAGRAM

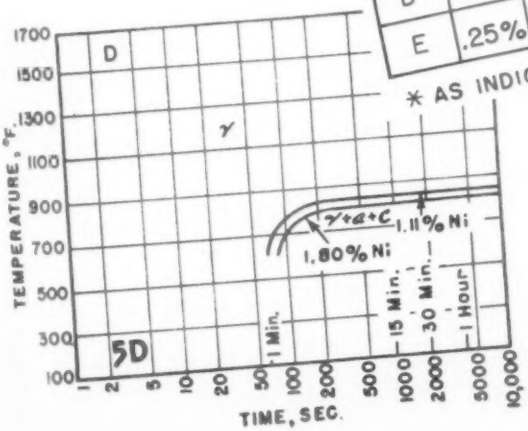


Fig. 5—Charts showing influence of manganese, molybdenum and nickel on the beginning of isothermal transformation in several heavily alloyed steels. They indicate that generous use of alloys leads to ready suppression of transformation within the pearlitic range, but is much less effective in suppressing transformation within the bainitic range

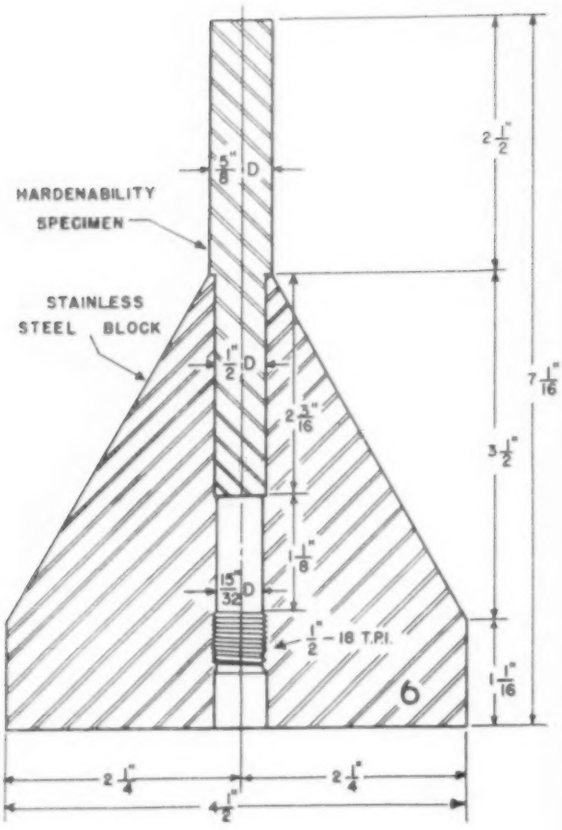


Fig. 6—Special air-cooled hardenability specimen and block designed to cover the range of cooling rates beyond the 5-in. thickness limit of the standard end-quench bar

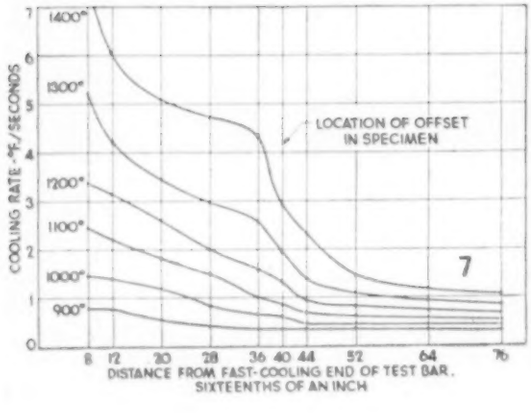


Fig. 7—Cooling rates obtained on the special hardenability bar

ing susceptibility, and the lower the martensitic transformation temperature, the greater is the quench-cracking susceptibility.

Carbon has a far more powerful effect in lowering the martensitic transformation range than any other element; hence, it is desirable to keep the carbon content of the steel as low as practical. Other common alloying elements also tend to lower the martensitic transformation range, but to a much lesser extent than carbon. Castings which contain drastic changes in section thickness are, of course, more susceptible to quench cracking than those of more uniform thickness. Thus, the shape of the casting imposes certain limits on the amount of alloy which can be used without encountering a prohibitive amount of cracking when the part is quenched.

Second, as the amount of alloy is raised, the susceptibility of the steel to temper brittleness is, in general, increased. Molybdenum is an exception to this general rule and, in fact, molybdenum may be used as a partial remedy for temper brittleness. Little advantage is to be obtained from the use of molybdenum in amounts greater than 0.5 per cent, since amounts of more than this seem to have little additional effect on the temper-brittleness characteristics and, as previously pointed out, do not increase the bainitic hardenability of the steel.

Table I indicates that, if the final hardness of the part is to be sufficiently low that tempering temperatures of about 1150 F or higher may be used, and if it is possible to water quench the part after the tempering operation, then steel compositions may be chosen which will produce castings at least 9 in. in thickness which are not temper embrittled. However, if the final hardness must be such that tempering temperatures within the range of 900 to about 1100 F are essential or if it is impossible to water quench after the tempering operation, then it is inevitable that such highly alloyed steel will show a considerable degree of temper embrittlement.

Third, use of large amounts of alloy leads to increased difficulty in obtaining hardnesses and structures that are readily machinable. Many large steel castings must undergo considerable amounts of machining prior to being placed in service. It is usually desirable, sometimes

TABLE I—V-notched Charpy Values for Heavily Alloyed Steels when Cooled from the Austenitizing Temperature At a Rate Equivalent to That In The Center of a Water-Quenched 9-in. Plate

Analysis, Per Cent	Heat 10997	Heat 10998	Heat 10999
C	0.27	0.28	0.29
Mn	1.50	2.14	1.28
Si	0.36	0.42	0.37
Ni	2.09		1.66
Cr	0.75	0.65	1.45
Mo	0.49	0.49	0.50
P	0.027	0.038	0.036
S	0.021	0.024	0.020

V-Notch Charpy Values*	Room Temp., Ft-lbs.	—40 F Ft-lbs.	Room Temp., Ft-lbs.	—40 F Ft-lbs.	Room Temp., Ft-lbs.	—40 F Ft-lbs.
Cooling rate after tempering.						
0.026 F/sec. at 900 F	66.0	44.0	65.0	29.5	59.5	25.5
1.16 F/sec. at 1000 F**	66.0	57.0	67.5	49.0	59.0	51.5

*Average of four tests.
**Equivalent to center cooling in water-quenched, 9-in. plate.

even essential, to develop a brinell hardness within the range of 180 to 250 for the machining operation. Use of large amounts of alloy may make it impossible to achieve this hardness range even by the use of tempering temperatures that are just below the critical for the steel employed. Thus, consideration of the annealing and softening characteristics of the steel may impose limits on the amount of alloy that can be used for a given part.

How Detrimental is Bainite? The several factors just discussed make it apparent that the initial goal of developing structures that are 100 per cent tempered martensite is not always feasible. Since pearlite transformation (and the associated ferrite transformation) is readily suppressed by relatively small amounts of alloy, these microstructures can be avoided. However, if limitations of the amount of alloy that can be used have been imposed by other considerations, it may be inevitable that bainite be present after quenching the part. This leads to a consideration of just how much inferior in mechanical properties are parts which contain some bainite to those which are completely martensitic after quenching.

A number of oversize Charpy specimens, cut from two heavily alloyed steels, were isothermally treated to develop considerable amounts of bainite in the structure. These specimens were then tempered to a hardness of 240 to 250 brinell (1200 F to 1250 F) and tested. The results may be compared with the results obtained on water-quenched specimens in Table II. At room temperature and even at 0 F, the presence of sizable percentages of bainite prior to tempering resulted in only a minor loss in notched-bar strength. At testing temperatures of minus 40 F and minus 80 F, the loss became conspicuous. The results also indicate that low-temperature bainite (that formed at 650 F) is less detrimental than that formed at a higher temperature.

Standard 0.505-inch tensile bars were similarly treated to contain bainite. The presence of tempered bainite in the final structure caused no significant loss in either tensile strength, elongation, or reduction of area. The yield strength, however, was from 5000 to 10,000 psi lower in four of the six isothermally treated samples than it was in the water-quenched samples. It would appear then that when the amount of alloy that can be used is limited by some consideration, leaner alloy steels which partially transform to bainite during quenching may be used without a large deterioration of mechanical properties.

Acknowledgments: The experimental data used herein were taken from various reports submitted to the War Metallurgy Committee, based on a research program sponsored by the National Defense Research Committee of the Office of Scientific Research and Development as NDRC research project NRC-14.

Grateful acknowldgment is made to the Office of Scientific Research and Development for their support and for their permission to publish this summary, to the War Metallurgy Division of NDRC, and to the War Metallurgy Committee for supervising and directing the research. Thanks are also due to many members of the Battelle staff for their helpful contributions, and especially to Dr. C. H. Lorig for his general guidance and direction.

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1. J. B. Austin, "The Flow of Heat in Metals," American Society for Metals.
2. W. T. Griffiths, L. B. Pfeil and N. P. Allen, "Intermediate Transformation in Alloy Steel." Iron & Steel Institute, Second Alloy Steel Report, No. 24, 1939, p. 343, abstracted in *Metal Progress*, Vol. 36, August, 1939, pp. 158 to 162, and 188.

Training Manual Is Revised

Short Term Training In The Foundry, by Gottfrid Olson; 174 pages 8¼ x 11 in. Ring type binder; published by National Founders Association, 120 South La Salle St., Chicago.

A considerable amount of new material has been added to this highly popular work first brought out in 1942, second edition in 1944 and this the third edition in 1946. As pointed out in the foreword, the primary purpose of the short term training course is to meet the need for more workmen in the foundry industry.

The present edition includes lessons on melting. Each of seven lessons deals with one specific melting unit or process. The material is presented in a manner that has come to be regarded as the most efficacious method of imparting instruction. Each subject is covered in a necessarily brief but satisfactory manner, and each lesson is followed by a searching list of questions, many of which entail further study of publications connected with certain phases of foundry work. The author points out that the course is not intended as a substitute for the regular four-year apprenticeship necessary to train a journeyman. However, it serves as a sound foundation.

TABLE II—The Effect of Bainite on V-notch Charpy Values

Treatment[1]	Micro-Structure[2] Before Tempering	Brinell[3] Hardness	V-Notch Charpy Values[3, 4] R.T.	0 F.	−40 F.	−80 F.
Water Quenched[5]	100% Martensite	242	62.5	61	60.5	61.5
10,000 sec. at 800 F.[5]	40% Bainite	243	65	60.5	56.5	51.5
1,000 sec. at 750 F.[5]	65% Bainite	247	54	52	40	27.5
1,000 sec. at 650 F.[5]	80% Bainite	243	63	56.5	56	53.5
Water Quenched[6]	100% Martensite	248	68.5	59	59	55
10 000 sec. at 800 F.[6]	50% Bainite	240	65	56.5	38	29.5
1,000 sec. at 750 F.[6]	65% Bainite	243	60	51.5	29	19.5
1,000 sec. at 650 F.[6]	90% Bainite	247	60	56.5	54	43.5

1. Austenitized for 20 minutes at 1700 F.
2. Balance of structure was martensite.
3. Hardness and Charpy values were determined after tempering. Tempering temperature was adjusted to give a final hardness of 240-250 brinell. All specimens were water quenched from the tempering temperature. Tempering temperatures were sufficiently high that temper brittleness should not have been involved under these conditions.
4. Average of three specimens.
5. Composition was .27% C, 1.50% Mn, .75% Cr, 2.09% Ni, .49% Mo.
6. Composition was .28% C, 2.14% Mn, .65% Cr, .49% Mo.

ELIMINATION OF Casting

Responsibility of foundry management in eliminating casting defects is discussed in this first of two articles prepared with the co-operation of the Meehanite Research Institute. Until recently the author was superintendent, Cooper-Bessemer Corp., Grove City, Pa., and photographs are by courtesy of that company

By GEORGE JOHNSTONE JR.
President and General Manager
Lawrence Foundry Co.
Grove City, Pa.

AN ENORMOUS amount of time, money and effort has been expended the past few decades to improve technical methods of production control and to raise the standards of gray iron foundry efficiency. Considering these facts, it is indeed deplorable that savings through scrap reduction are not proportionate to research expenditures.

Losses involving from 5 to 10 per cent of total output are regarded by the average iron foundry as a normal state of affairs. This indicates absolutely no advance by the industry since thirty or forty years ago. It is argued that there is no parallel to foundry work standards in any other modern industrial field. The excuse of increasing complication of modern casting design and more severe service conditions is very feeble, since this also applies almost without exception to other industries. Yet what other industry would tolerate losses of 5 to 10 per cent of total output, due to carelessness, lack of co-ordinated control and indifference to the accumulated evils incurred through such losses?

Before proceeding to practical details involved in reduction and elimination of defectives it would be well to consider some fundamental aspects of the problem.

Three basic factors must be considered in this connection:

1. **Mental Attitude Toward Defectives:** In considering the basic conditions responsible for defective work, it is evident that the main factor is apathetic toleration of defectives in the foundry. The mental attitude of management and staff is to expect defective castings. They are accepted as a matter of course and, provided that they are kept down to what is considered a normal working range, no particular attention is given the matter.

It is highly significant that only where this traditional foundry attitude has given place to modern conceptions of production methods that any real improvement has been obtained. This is proved to some extent in mechanized foundries although mechanization will not, of itself, reduce defectives unless it is accompanied by the correct mental attitude and the re-orientation of all personnel to such changes. Tolera-

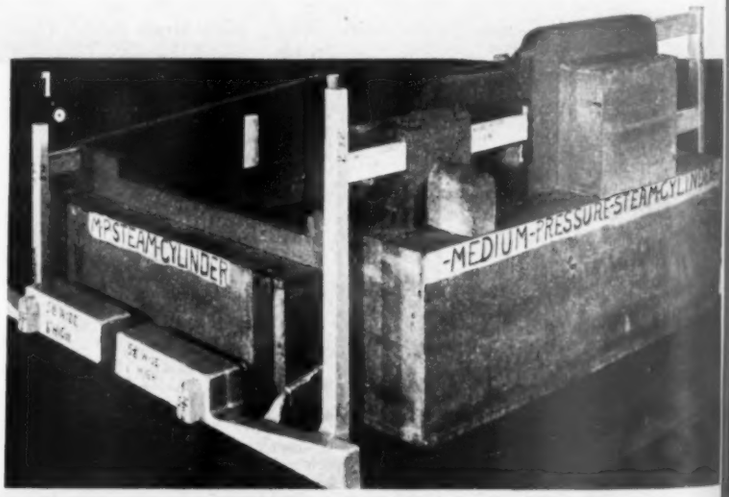


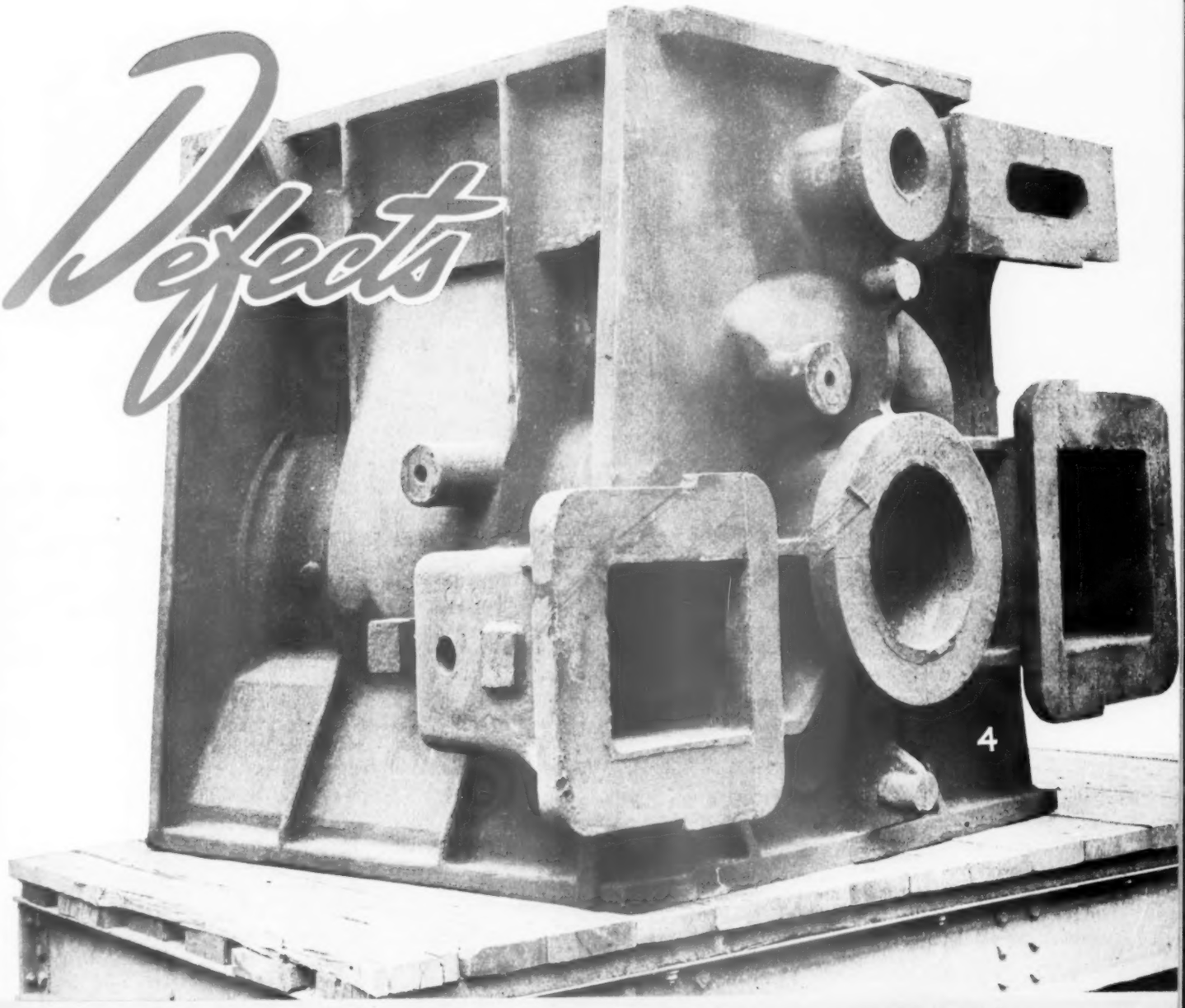
Fig. 1—Drag half pattern for medium pressure cylinder of reciprocating steam engine

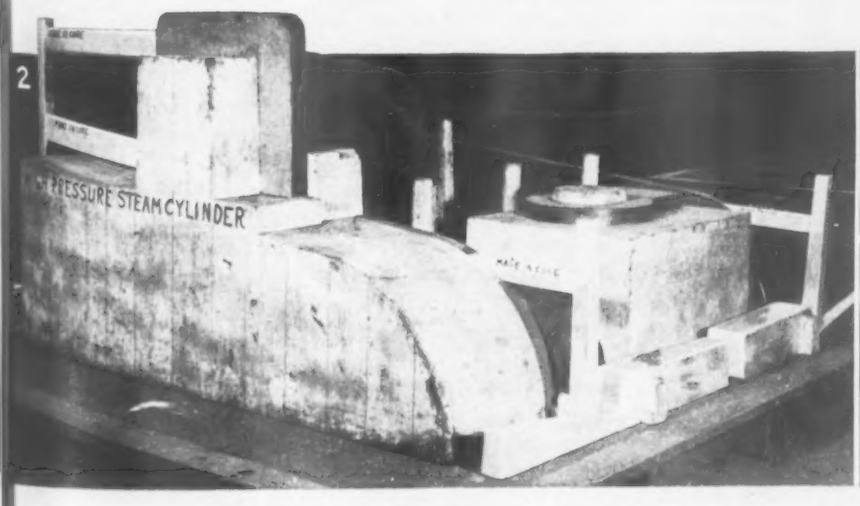
Fig. 2—Pattern for drag half of high pressure cylinder viewed from foot side. Note steamer plugs in center of pattern to accelerate drying of deep pockets and insure removal of all steam

Fig. 3—Same pattern as Fig. 2 viewed from other side and with all gates attached. The mold was poured from two ladles

Fig. 4—High pressure cylinder casting ready for shipment. Meeting the required machining tolerances was largely the result of the pattern and flask equipment employed

Defects





tion of scrap must be abandoned and until this attitude changes, the production of castings will remain a gamble. Change of mental attitude is bound to be followed by rapid development of technical skills and knowledge.

The insertion of a percentage factor covering scrap castings in compiling estimates may be considered as a hedge against loss by the foundry. This again is an example of mental attitude responsible for defectives and actually defeats its own purpose.

All defective work should be considered as a loss to the foundry. Addition of any loss factor to the sales price will not remove or even minimize the effects of the losses. Defectives can have but one result—reduced foundry profits. Neither does this give any consideration to the low casting standards generally associated with foundries where defectives are not controlled.

If a foundry lacks the mentality and organization to control its defectives, then it cannot assume a percentage of defective work and base an estimate and sales price on that assumption. Any such assumption presupposes the ability to control defectives, and if a foundry could be sure of controlling its defectives at 8 per cent, then it could also be sure of holding them at 5 per cent, or even 1 per cent.

2. **Responsibility of Management:** The scrap problem is essentially a management problem. In fact, it may be stated as a general rule that the percentage of defective work is inversely proportional to the attention given by the foundry management to this matter.

Management is directly concerned with obtaining maximum operating efficiency, and elimination of defectives is as closely related to efficiency as is production capacity.

Defective castings may be classified into two fundamental divisions, the first due to defective working materials and the second due to defective workmanship.

3. **Nature and Conditions of Work:** The duties of foundry management in their broadest sense include:

First: Provision of a suitable place for men to work. This simple statement should not be loosely interpreted nor associated with minimum requirements of law. Some of the smallest foundries in operation today are classic examples of intelligent provision by management of first-class working conditions. On the other hand, some large foundries today indicate no considered effort to remedy conditions, which in recent years have branded the industry as "hot, heavy and dirty."

Production hazards vary considerably from one industry to another and the foundry industry has probably more to contend with in this respect than most others. This includes not only personal hazards to the worker, but also operating hazards; the chances of errors of judgment so affecting the quality of product as to render it unusable. In foundries where the best possible methods of control are used many variables are involved, and many of these variables are such as to offer little guarantee of perfection in the finished product. The greatest variable in production of castings is the human element, which is prone under the best of circumstances to be erratic and undependable.

Working Conditions an Important Factor

It is therefore extremely important that working conditions be the best obtainable in order to compensate for the many difficulties inherent to foundry work. Actual conditions, however, are the exact opposite. The average foundry suffers from poor lighting, insufficient ventilation, extremes of temperature, lack of suitable equipment, uncleanliness and general disorder. Many foundries lack the first essential in providing decent working conditions, that is, a reasonably clean house. A dirty and untidy foundry is, as a rule, a good indication of slovenly and defective work. A campaign in cleanliness in the most primitive foundry will prove more than justifiable through increased efficiency, almost certain reduction of defectives, and improved labor-management relations.

Second: Supply of correct working equipment and materials. It is not to be expected that efficient, high quality production can be obtained if the necessary equipment is lacking or if the available equipment is not operating at maximum efficiency. This is realized by other industries but not yet fully appreciated by the foundry. Regardless of how limited or how great the mechanization of a foundry operation, unless the mechanical units are adequately maintained, and unless production is planned to utilize these units to maximum productivity, the investment stands little chance of paying for itself. Unquestionably, the adoption of mechanical production methods does offer the foundry industry ultimate salvation.

The reduction of defectives will again prove to be in direct proportion to the efficiency and maintenance of equipment.

Indifference to this necessity has, as its most glaring example, complete disregard by many foundries for fixed standards in flask equipment. Dimensional defects in the castings are perhaps the greatest source of loss to the industry, and are directly traceable in almost all cases to faulty patterns, coreboxes and flasks. Errors due to distorted patterns and coreboxes are invariably discovered in core assembly in the mold and are either corrected after a fashion or the mold and cores are scrapped. Castings produced (*Please turn to page* 164)

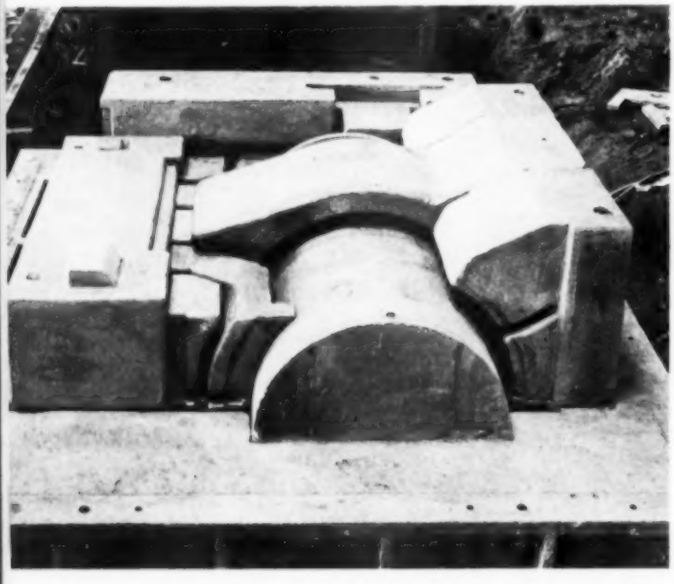


Fig. 5—Complete core assembly made from pattern equipment shown in Fig. 1

A·S·T·M reviews CASTING SPECIFICATIONS

By EDWIN BREMER
Metallurgical Editor
THE FOUNDRY

FORTY-NINTH annual meeting of the American Society for Testing Materials, held at Hotel Statler, Buffalo, June 24 to 28, was somewhat unusual in that many of the technical sessions comprised symposiums on such subjects as bearings, fatigue, spectroscopic light sources, oil procurement practices, testing parts and assemblies, pH measurements, atmospheric weathering of corrosion-resisting steels, and freezing and thawing tests of concrete. First day of the meeting was devoted entirely to committee meetings, and in view of the forthcoming publication of the new 1946 *Book of ASTM Standards*, all standards and tentatives were reviewed carefully and any necessary changes made to bring them into line with present concepts. As a part of that study all emergency alternate provisions and emergency standards have been discontinued.

Annual dinner of the society was held Wednesday evening at which President J. R. Townsend, Bell Telephone Laboratories Inc., New York, presented his address and called on engineers to participate more actively in national affairs. B. K. Sandwell, editor, *Saturday Night*, Toronto, Ont., spoke on "A Testing Time for Canada." Newly elected officers introduced included: President, Arthur W. Carpenter, B. F. Goodrich Co., Akron, O.; vice president, Richard L. Templin, Aluminum Co. of America, New Kensington, Pa.; directors—A. G. Ashcroft, Alexander Smith & Sons Carpet Co., Yonkers, N. Y.; A. T. Chameroy, Sears, Roebuck & Co., Chicago; J. H. Foote, Commonwealth & Southern Corp., Jackson, Mich.; F. E. Richart, University of Illinois, Urbana, Ill., and L. H. Winkler, Bethlehem Steel Co., Bethlehem, Pa.

ARTHUR W. CARPENTER
President, ASTM

RICHARD L. TEMPLIN
Vice President, ASTM

Awarded Honorary Memberships in Society

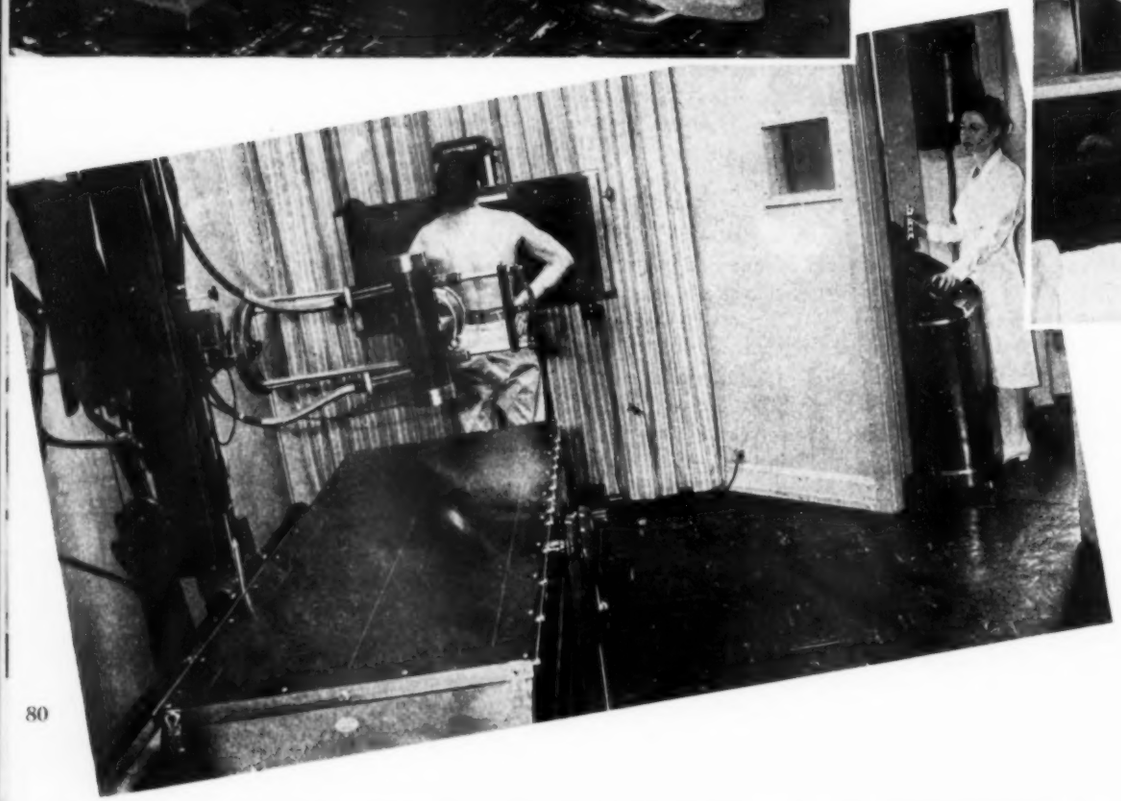
Honorary memberships in ASTM were awarded to Walter H. Fulweiler, Philadelphia; James O. Leech, Pittsburgh; John S. Miller, Rahway, N. J.; Charles S. Reeve, Leonia, N. J.; Jesse J. Shuman, Jones & Laughlin Steel Corp., Pittsburgh, and Frank N. Speller, Pittsburgh. Certificates for 40-year membership in the society were presented to 19 individuals and firms, including the American Steel Foundries. Edgar Marburg Lecture was presented Wednesday afternoon by Dr. J. J. Mattiello, Hilo Varnish Corp., on "Protective Organic Coatings as Engineering Materials." The Charles B. Dudley Medal was awarded to H. R. Copson, International Nickel Co. Inc., Bayonne, N. J., for his paper "A Theory of the Mechanism of Rusting of Low Alloy Steels in the Atmosphere," while the Richard L. Templin Award was made to R. C. Brumfield, U. S. Naval Ordnanace Test Station, Pasadena, Calif., for his paper "A Sulphur Print Method for the Study of Crack Growth in the Corrosion-fatigue of Metals".

Registration for the meeting was well over 1800, and most of the technical sessions had capacity attendance. One paper presented at a meeting Tuesday night of particular interest to gray iron foundrymen was that by James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala., on "Brinell Hardness of Gray Cast Iron and Its Relation to Some Other Properties." From a study of data from 1553 sets of test bars ranging in diameter from 0.875 to 10 in. as well as those cut from castings, Mr. MacKenzie developed a number of relationships between brinell hardness number and tensile strength, transverse strength and tensile strength, etc. Statistical study of the data indicated that the brinell-tensile relationship best is shown by a curve of the following form: $T.S. = 1.82(BHN)^{1.85}$. Most of the data was presented in the form of curves or tables. Mr. MacKenzie's paper will be presented in an early issue of THE FOUNDRY.

Report of Committee A-1 on Steel, presented by Norman L. Mochel, chairman, indicated some changes in tentative specification A 217-44 T on Alloy Steel Castings Suitable for Fusion Welding for High-temperature Service which includes a new grade WC3 containing 0.30 max. C, 0.70 max. Mn, 0.05 max. P, 0.06 max. S, 0.60 max. Si, 0.40 to 0.70 Cr, and 0.40 to 0.60 Mo. Grade WC4 was revised and now contains 0.30 max. C, 0.70 max. Mn, 0.05 max. P, 0.06 max. S, 0.60 max. Si, (*Please turn to page* 244)

Medical

Left—Dr. Garry G. Bassett making fluoroscopic examination at new medical department of the Ferro Machine & Foundry Co., Cleveland
Below—X-ray technician developing film



Left—Chest x-ray being taken on 200-ma machine

Right—Dr. Bassett checks blood pressure, part of the general physical examination given prospective employees

Facilities— A Foundry Asset

By JOHN M. PRICE
President
Ferro Machine & Foundry Co.
Cleveland

IT'S always interesting for a man who has been active in industry to look back over the period and check on the progress which has been made, on the new ideas which have developed and gained acceptance, and on the change in basic philosophy.

The recent organization of a modern well-equipped medical department in our foundry encourages me to take this backward glance and to bring myself up to date.

During my 35 years in industry I have seen many changes. New products have supplanted old products, new methods have supplanted old methods, new machines have pushed old machines into the discard.

But to me the most interesting development has been the change in human relations which exist between the men in the plant and the management which operates the plant.

In this field of industry, our entire philosophy has undergone a sharp and dramatic change. Many of us whose industrial experience goes back into the early years of the century remember vividly the days when an employee was a "hand."

We hired a man because he seemed to have the physical stamina to do the job which we had in mind. Employment departments, as we understand them today, were rare and unusual. No particular effort was made to find out how the new employee would fit into his job, whether he could stand the kind of work for which he was being hired, and whether he would be an asset to the company.

Furthest from our thoughts was whether or not he would like the job for which he was being employed. If he didn't work out, we let him go. We never paid a great deal of attention to picking the man for the job because I think very few of us stopped to think that as soon as a man was put on the payroll the company began to build up an investment in him. And that that investment became heavier as the man acquired skill and only paid off if the new employee stayed at work long enough to really become thoroughly familiar with his work.

In contrast, if we bought a machine, we looked over catalogs, we talked to salesmen, we talked to other users of the same equipment. When we finally bought the machine, we tried to keep it in efficient running order. The machine had represented a definite layout of so many dollars.

I think industry as a whole was short-sighted in its attitude and I, for one, am glad to see that we have changed our entire viewpoint on the place which men have in our organizations.

I said earlier that the establishment of a medical department directed my thinking in this direction.

Why did we establish a medical department? To be absolutely honest, it was started for two reasons:

First, because we wanted better employees who could do a better job for Ferro.

(*Please turn to page* 222)

General factors involved in use of the permanent mold process in casting aluminum are discussed here. The paper originally was presented by the author at the ninth annual Regional Foundry Conference in Milwaukee

Permanent Molds FOR CASTING

By VINCENT J. SEDLON
President
Master Pattern Co.
Cleveland

THIS discussion of permanent molds is prompted by the increased interest shown by many foundrymen and a desire to introduce the permanent mold system of making aluminum castings to those not yet acquainted with it. It is intended to disclose the advantages and disadvantages of this method by comparison with the sand mold method and to deal in a general way in the designing, making and the use of the mold to produce aluminum castings. No attempt will be made in the short space of this article to delve into detailed analysis of the materials or to discuss the solution of complicated mold problems.

A permanent mold is a two or more part metal body designed to open and close in alignment and is provided with cavities into which molten metal is poured and solidified into form and subsequently ejected. It should be mentioned here that the mold is not permanent, as the name implies, but is subject to wear and to deterioration in use.

These molds generally consist of two or more parts mounted on a base plate. In order to remove the casting from the mold the mold parts are made to open and close and they are kept in relative alignment to each other by means of hinges or by tracks and guide rails. The mold may be operated by lever or racks and pinions or by the use of air cylinders.

In places of back draft or undercuts, which would prevent the ejecting of the casting from the mold, it is necessary to use loose pieces as in patternmaking. These loose pieces are called *plugs* or *pryouts*, and they are pulled away from the casting to remove the obstruction and permit an easy withdrawal of the casting.

By reason of the varied differences in size and shape of castings to be produced, each mold is individually designed to meet the requirements for good production practice. Wood patterns are made for the mold castings and ⅛-in. of stock is provided for the machining of contact surfaces and mold cavities. Factors which must be taken into consideration in the engineering of a mold are the distribution, radiation and the retention of heat which is developed from continuous pouring into the mold. This is of great importance in producing sound castings and, accordingly, mold wall thicknesses will vary from ¾-in. to 1½ in. or more in thickness according to the size and character of the castings to be made.

A rule-of-thumb method to determine the mold wall thickness is to make the wall four times the thickness of the casting but, for practical reasons, not less than approximately ¾-in. Substantial ribs and flanges to strengthen the mold are cast into the back, and clamping lugs and clamps are provided to lock the mold halves together during pouring. We have found Grade "A" Meehanite iron to be a very suitable material for molds because of its durability under the heat conditions to which a mold is subjected.

In molds where the casting may cling to the cavity, ejector pins are provided to press out or eject the casting from the cavity. These pins are held in position on the back of the mold by a bracket and ejector plate, which is generally operated by means of racks and pinions.

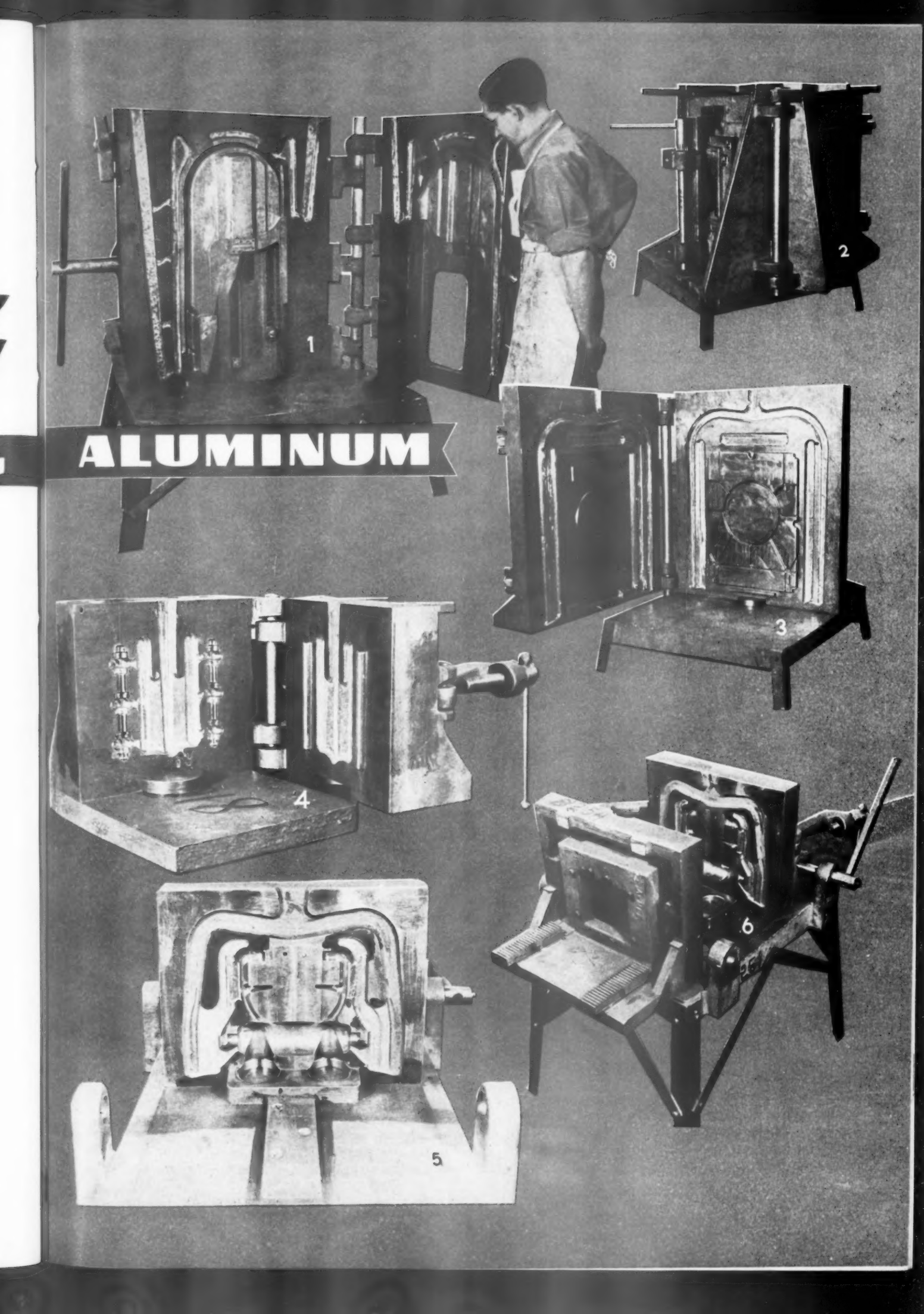
As in most mechanical devices it is best to strive for simplicity in designing permanent molds. Moving parts wear out and go out of adjustment and also slow down the operation of the mold. From time to time, it becomes necessary to take the mold apart for the purpose of cleaning or to replace broken parts. For these reasons the design should be such as to permit this action with the least amount of difficulty; then too, provisions must be made to

Fig. 1—Center core section of this hinge mold pulls down through the base

Figs. 2 and 3—Back and front views of a permanent mold. The former shows ejector plate and ejector mechanism

Fig. 4—Hinge mold incorporating six cavities

Figs. 5 and 6—Two views of a two-cavity mold showing gating arrangement


ALUMINUM
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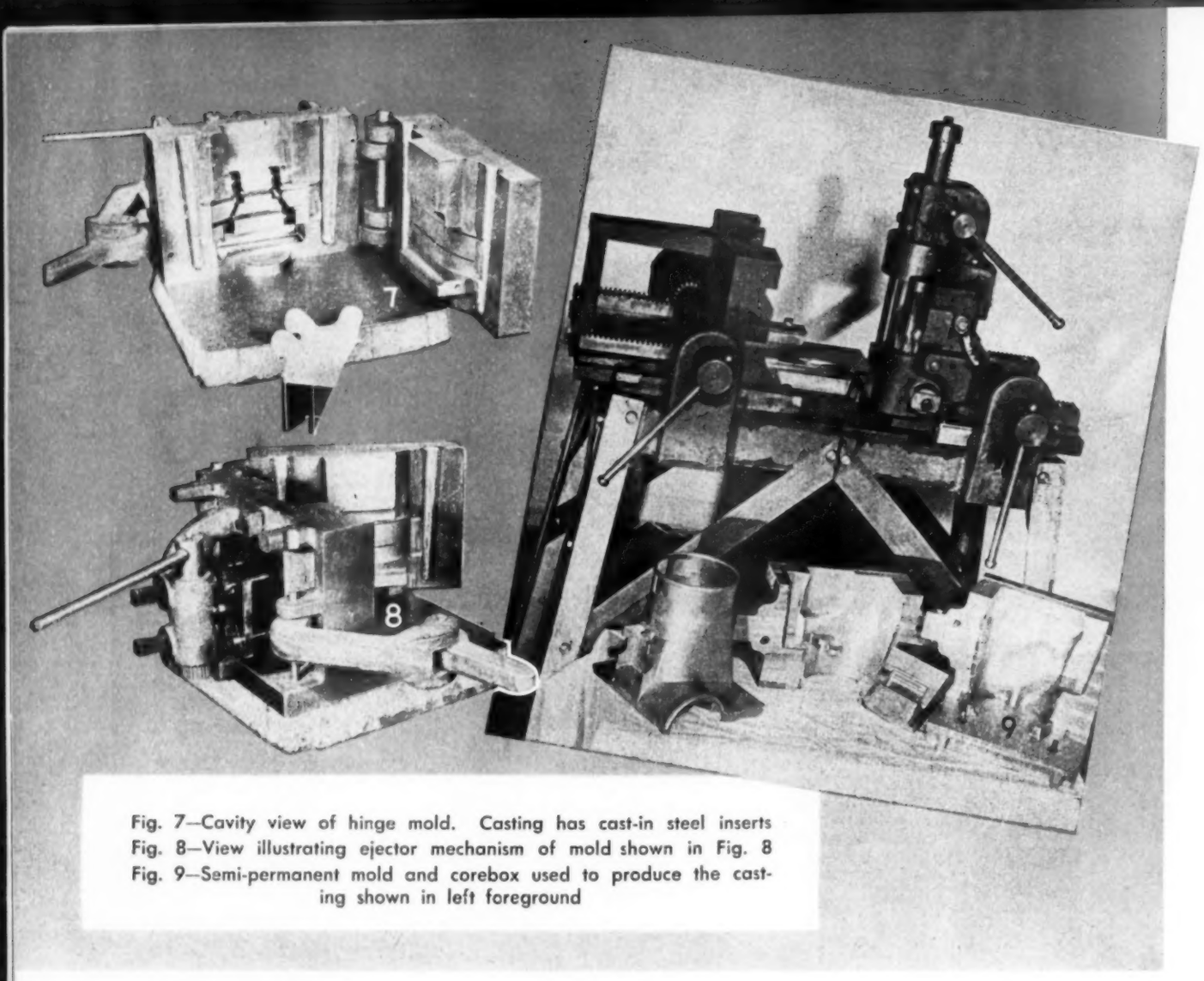


Fig. 7—Cavity view of hinge mold. Casting has cast-in steel inserts
Fig. 8—View illustrating ejector mechanism of mold shown in Fig. 8
Fig. 9—Semi-permanent mold and corebox used to produce the casting shown in left foreground

allow the mold to be opened sufficiently to permit an easy approach to the cavity for the purpose of spraying the mold.

In some instances the molds are designed by the customers, especially in extremely high production foundries where multiple molds are made to fit on air-operated machines. However, in the average jobbing work no specifications are given and the mold maker proceeds to design the mold with only the part drawing and his experience to guide him. The fundamental problems of gating, risering and venting to produce castings in sand molds are also present in permanent molds. The mold maker positions the cavity to its best advantage in the mold, taking into consideration the down sprue, gates, risers and the reaction of the metal in the process of solidification.

Other factors in the planning of a mold are: Determining the best parting, providing supports for sand cores if necessary, allowing for shrinkage of metal and including a draft angle to permit the removal of the casting. Operating levers, which actuate moving parts of the mold, should be conveniently located and all mechanism should be designed to act freely.

The average 5 to 10 lb casting with ¼ to ½-in. wall thickness can be made at the approximate rate of 30 per hour in a manually operated mold. Thus in two minute intervals the metal is poured, solidified, the mold is opened, the casting withdrawn, then the mold is closed and clamped and ready to repeat the process. Larger and heavier castings will require longer intervals between pouring time and, conversely, smaller castings are made more rapidly. A 10-in. frying pan in a single cavity hinge mold, operated by one man, may be produced at the rate of 40 per hour. In a 2-ton manually-operated mold a meat cutting band saw housing 36 in. long, 14 in. wide and 5 in. in depth is being produced in eight-minute intervals by two men.

Small castings may be made in multiple cavities of two or more depending on the size of the job. When correctly designed, gated, risered and vented, multiple cavity molds are practical and necessary for good production.

The life of a permanent mold designed and used for aluminum castings is estimated to be between 30 and 80 thousand pourings. When larger quantities are required two or more molds are made.

Before pouring into the mold a coating is applied to the cavity. This coating not only slows down the deterioration of the mold but also acts as a separator to prevent adhesion and permit easy removal of the casting. Ready-mixed coatings, which have proved very satisfactory are now on the market and sold under various trade names. This coating is sprayed on the cavities and is applied when the mold is hot, and at intervals whenever the coating shows wear. The down sprue, gate and risers receive a different treatment. (*Please turn to page* 192)

A comparison of PRECISION CASTING Methods

By W. A. MOREY

This paper was presented at the recent foundry conference held at Lansing, Mich., by the four Michigan chapters of the AFA and the Engineering Department of Michigan State College. The author is a patent attorney and former captain in the Chicago Ordnance District

PRECISION casting is a somewhat abused term often employed to designate the lost wax investment casting process. To at least some extent the inclusion of the word *precision* in such a definition is improper since, like other processes, the lost wax investment casting process will yield precision results only in proportion to the care exercised in the execution of the work. Properly, precision casting should mean just exactly what the term implies and should not be employed to designate any specific process. Properly, the phrase *investment casting* is the most suitable for use in defining the lost wax investment casting process since it is characterized primarily by the use of a molding material which completely enrobes or invests an expendable pattern.

Investment casting, as a process, has been described in many excellent articles published in the last two or three years. If for no other reason but to serve as a basis of comparison, it seems desirable to review briefly the investment casting process.

Generally speaking, there are two types of investment casting distinguished by the presence or absence of a primary investment. The term *primary investment* designates a coating applied to an expendable pattern before the main body of molding material is poured around the pattern. The pattern employed must be expendable in some manner, usually through the application of heat to cause vaporization or melting. Wax is customarily employed as pattern material, but various plastic materials, such as polystyrene, are becoming increasingly popular. Low melting point alloys also have been used to some extent.

The pattern is formed by pouring or injecting the selected material into a die which may be steel or a relatively soft metal formed by conventional processes. After removal of the die, the flash is trimmed and the expendable pattern mounted on a button. Careful attention is given to the position of the sprues to eliminate porosity turbulence and shrinkage in casting.

If a primary investment is to be employed, it is applied to the pattern at this point. Primary investments generally include a refractory material, such as cristobalite sand, with a binder and other modifying ingredients. It may be applied by dipping or spraying. Great care is taken to eliminate all air bubbles from the surface and insure close adherence of the investment material to the pattern. In most instances after application a relatively coarse sand is sprinkled over the primary investment to insure proper bonding between the primary and secondary investments. This is necessary since the sands employed in the primary investment usually are well under 40 micron size.

After the primary investment has dried, the pattern is mounted on some type of base, such as steel or rubber. Wax can be used to anchor the pattern to the steel plate. A can of heat resisting material, such as stainless steel, is placed over the pattern and secured to the base to contain the secondary investment. If a primary investment has been employed, the secondary investment can contain relatively coarse aggregates to provide good porosity and resistance to cracking. However, if no primary investment has been employed, the secondary investment must be composed of very fine aggregates and great care taken to eliminate substantially all air from the mix.

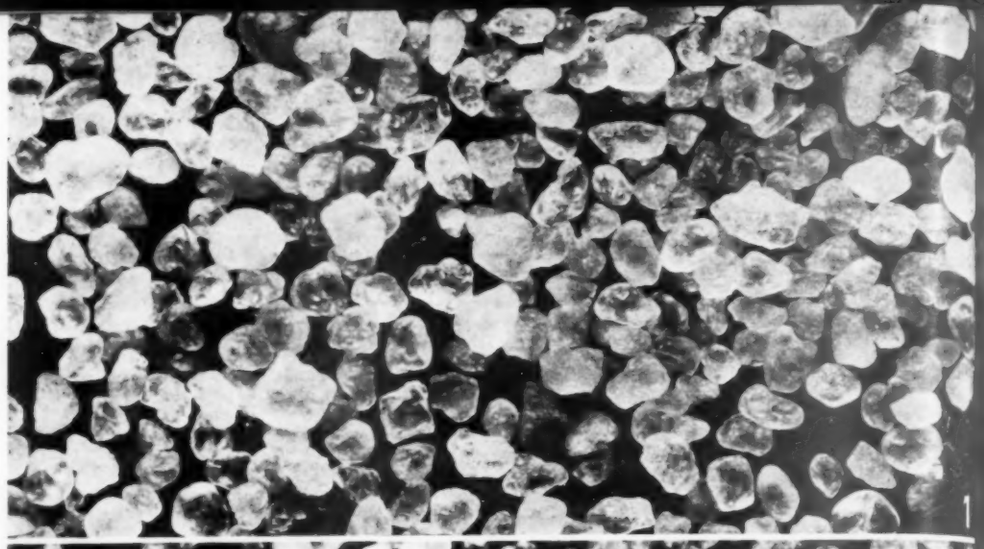
Exact composition of the various mixtures employed for primary and secondary investments varies between wide limits. While the employed refrectory ordinarily is sand, the binder may consist primarily of a silicate, phosphate or aluminate in many various forms. One of the most popular is ortho-ethyl-silicate.

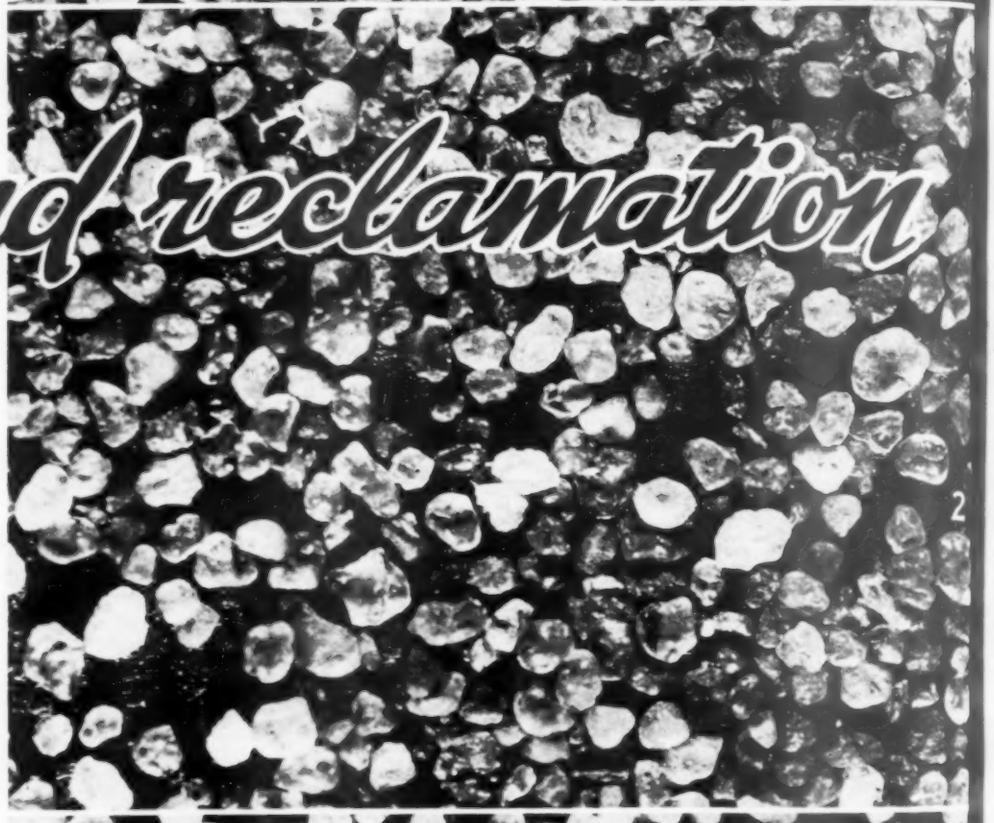
When a sufficient quantity of investment material has been placed properly around the pattern, the mold is allowed to dry. Time of drying and the temperature are dependent upon the type of binder and pattern material. Care must be taken in drying to hold the temperatures below the softening point of the pattern material. In the case of wax, a drying temperature of approximately 120 F can be employed and this temperature can be increased to some extent by employing plastics having higher softening points.

After drying, the pattern is removed by the application of heat. The inverted mold is placed over a heat source and the wax allowed to drain from (*Please turn to page* 216)

This discussion of various methods of reclaiming sand used in the ferrous foundry originally was presented by the author at the ninth annual Wisconsin Regional Conference

Sand reclamation for the ferrous foundry





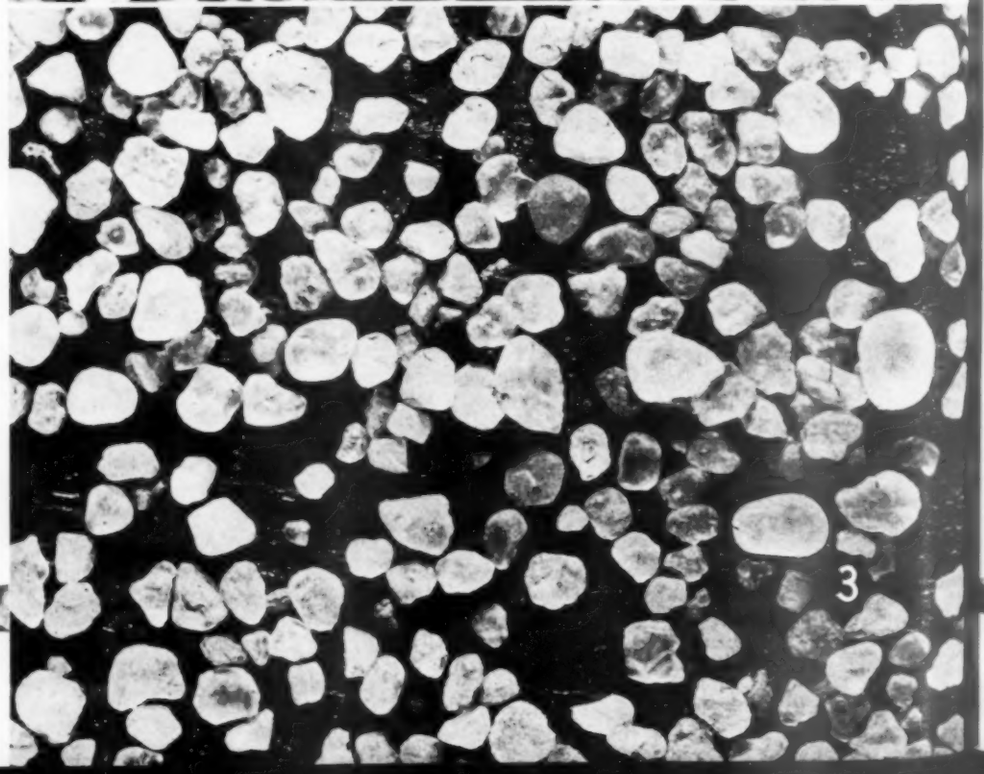


Fig. 1—Enlarged view of new sharp sand grains
Fig. 2—Roasted and dry scrubbed reclaimed sand
Fig. 3—Wet Reclaimed sand

By E. C. JETER
Ford Motor Co.
Dearborn, Mich.

IN THE PAST year or more, many foundries engaged in ferrous casting have become intensely interested in the possibilities of dry or core sand reclamation. They are moved for the most part by the economics of obtaining suitable sand for cores and other dry sand work. They are also influenced by the physical difficulties arising from moving sand into their plant and disposing of the waste after it is used in only one cycle of casting.

Storing enough sand for winter use for large foundries is a task of some magnitude. Due to the amount of sand necessarily stored, many large foundries do not have facilities to protect their sand pile against the weather; nor do they have adequate drying facilities. The result is the use of a sand of varying moisture content which causes numerous difficulties. Large foundries in cities pay out considerable money for hauling waste sand to dumps. In fact, in some cases, this cost is higher than the original cost of the sand at the pit.

Foundries interested in sand reclamation do not have to proceed blindly. Several foundries have reclamation facilities now operating successfully from the standpoint of economy. Some of these have been in operation for several years, and these companies are to be commended for their boldness and foresightedness. Information that they have freely given the industry has been valuable as an aid to foundries contemplating getting into the reclamation field.

During the war many of the large aluminum and magnesium foundries making aircraft castings had reclamation units. This reclamation was accomplished by roasting at temperatures of 1300 to 1500 F. Cores or molds made from this sand were entirely satisfactory.

The roasting of this sand was done in both vertical furnaces with horizontal hearths, and rotating horizontal furnaces. Both type furnaces proved satisfactory and, except perhaps for maintenance, there would be little to choose between the two types.

Reclaimed Sand Lacked Physical Properties

When it was decided by the Ford Motor Co. to put in a reclamation system for its gray iron foundry, the first experiments were tried by roasting and removing the loose fines. A suitable particle distribution was obtained, but tensile strengths were found to be only 70 to 80 per cent of strengths of new sand with the same amount of oil. Increasing this oil did increase physical properties but not to any safe level. More oil additions would not be the proper answer even if tensile strength had been brought up to a suitable level.

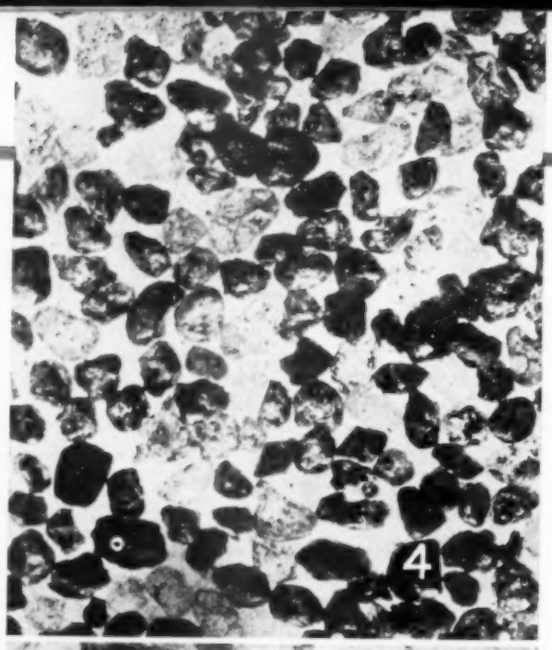
This sand was also screened and a synthetic classification arranged by adding suitable percentages of the different sized grains. The screen analysis was then brought to the same as that of new sand presently used. Physical properties were still not in line with those of new sand.

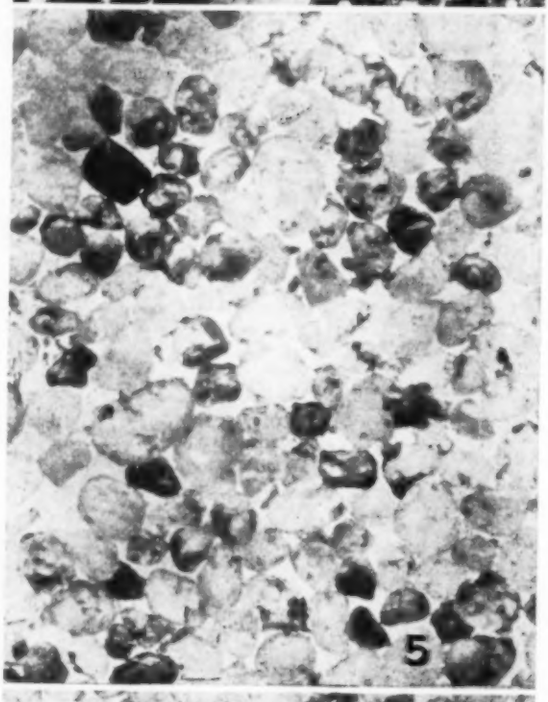
Other attempts were made by washing this roasted sand with no success.

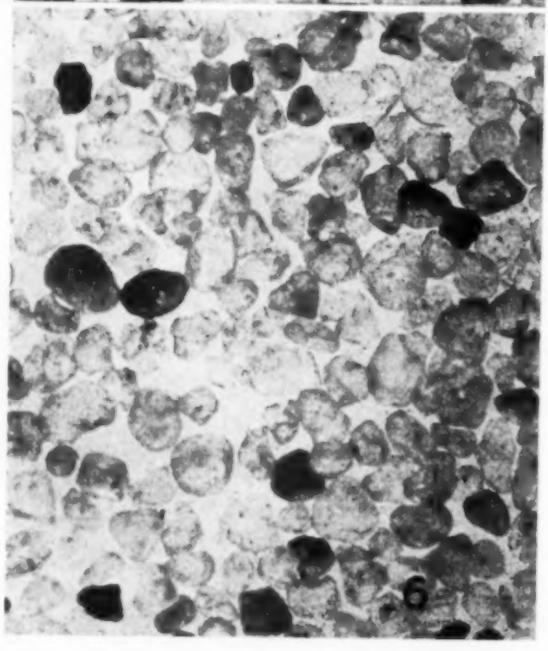
It was apparent that more than mere roasting or washing had to be done. Other foundries had also found this to be the case. That the method of reclaiming sand by roasting only is entirely satisfactory for aluminum and magnesium foundries has been proved by experience. That this same method is not satisfactory for ferrous foundries also has been proved by numerous experiments. Why, then, is this true? To the writer's knowledge, there is no evidence of enough cleavage of sand particles either in casting operation or in roasting operation to account for this condition.

The answer can be found, upon examination microscopically, to be not the condition of the sand grains themselves, but the deposit on these grains of sand. Examination of a roasted sand from a ferrous foundry reveals a close fitting clay coating. This is not present to any great extent on sand from the nonferrous foundry.

Aluminum and magnesium foundries do not add clays to any large extent to their sand. Therefore, there is not much fine clay present. The aluminum and magnesium







foundries practicing reclamation by roasting have a minimum of green sand and, in fact, some of them have no green sand at all in their molds. Clay does accumulate to some extent through contamination with whatever green sand is present, but the casting temperatures are so low that there is no sintering of clay to sand grains.

The ferrous foundry, on the other hand, adds clay to its dry sands. It also has much more chance of contamination with green sand. Many castings contain only small cores with the larger percentage of the mold being green sand which becomes mixed with the spent dry sand at the shakeout. The temperature reached in casting in the ferrous foundries is enough to sinter clay to sand particle surfaces.

These close-adhering coatings on sand grains cut down binder effectiveness. It then becomes necessary in any reclamation unit to have some means of dislocating and removing this close fitting clay coating as well as a means of removing oil and a means of classification.

Requirements for Satisfactory Reclaimed Sand

In order to obtain satisfactory reclaimed sand it must then be concluded that the following points must be adequately accomplished:

a. The partially oxidized binding oil and carbonaceous matter must be removed.

b. Loose fines must be separated and removed in order to maintain proper grain size.

c. Sintered clay coatings on sand grains must be dislocated and removed.

d. Sand must be delivered to core rooms at proper moisture content.

Two distinct methods of reclamation have been developed to accomplish the foregoing requirements. One is the wet method of scrubbing and classification, and the other is the roasting and dry scrubbing method. The wet method is now in use and has actual operating experience behind it. The dry method has only numerous experiments behind it.

Either method, however, can be made to accomplish the four requirements to varying degrees. The removal of the oil and carbonaceous matter can be accomplished by roasting, or, as the advocates of wet reclamation advise, by wet scrubbing. Loose fines can be removed by wet classification and by a dry classification. The fixed clay coatings can be dislocated by wet scrubbing or dry scrubbing. These would then be separated and removed by the same classification used to remove loose fines. This operation of scrubbing either wet or dry is the point on which a reclamation system for sand from a ferrous foundry differs from one for sand from an aluminum or magnesium foundry.

The problem of a foundry contemplating sand reclama-

Fig. 4—Core sand taken from cylinder block shakeout

Fig. 5—Sand grains from ferrous foundry shakeout after being roasted only

Fig. 6—Core sand from aluminum foundry shakeout following roasting

tion is to weigh all the evidence and install the system best suited to the conditions. Wet reclamation already is an accomplished fact, and to the writer's knowledge, no other method is now in production in a ferrous foundry. Perhaps the wet method should be accepted as the one successful method. It certainly is not the writer's intention to criticise it except perhaps in a constructive way by discussing it and its adaptations to certain conditions. It is also the endeavor of the writer to point out that there are perhaps other methods just as suitable to certain conditions.

Wet Reclamation of Sand: This method of reclamation has been adequately described by William Rengering and Walter Horth of Cincinnati Milling Machine Co. in their paper "Reclaiming Foundry Sand by the Wet Method", published in *Iron Age*, July 6, 1944, and by Ronald Webster and A. C. Den Breejan in their paper "Sand Reclamation", published in *American Foundryman*, August, 1945.

By this method sand is taken from shakeout, screened and pumped suspended in water to a reclamation station. There the sand is again screened and metallic particles removed. After this the sand is dewatered and wet scrubbed in muller or other suitable unit to remove oxidized oil and clay coatings. Sand then goes to wet classifier where the undesirable fines and dislocated clays are removed. The reusable portion is pumped to a centrifuge where excess water is removed. Balance of moisture is then removed in rotary or other suitable dryer. Sand is then ready for use.

The clay sludge suspended in water removed at the classifier is pumped to a water clarifier where settling takes place and water is recirculated through system.

Dry Method: This method was described to some extent by W. L. Hartley in his paper "Thermal Process of Core Sand Reclamation", *AFA Transactions*, Vol. 51, September, 1943 to June, 1944. Here the sand from shakeout is crushed, metallic particles removed magnetically and sand conveyed to roasting oven. This oven may be a roasting kiln type or the vertical furnace with rotating horizontals hearths. Operating temperatures are between 1300 and 1500 F. All oxidized oil and organic matter are removed here. Sand from this roaster is then cooled and dry scrubbed by a mulling operation for approximately 5 minutes. The dry scrubbing will dislocate fixed clays. Separation and removal of these clays plus already loose fines can be accomplished (*Please turn to page* 172)

TABLE 1—Dry Strength of New Sand and Sand Reclaimed by Roasting Only

Type Sand	Screen Analysis							Per Cent on 3 Adjacent Screens	Physical Properties– Standard Permeability	Dry Tensile
	20	30	40	50	70	100	Pan			
New Sharp Sand	....	..	8.0	54.0	34.7	2.0	1.3	95.7	326	229
Shakeout Core	....	..	17.0	40.5	30.0	6.6	5.9	87.5	398	179
Sand Roasted at 1500 F	....	1.0	11.0	47.0	29.0	6.0	5.8	84.2	347	162

All mixes 100:1 sand-oil mix.

TABLE II—Dry Strength of New Sand and Sand Reclaimed by Wet Method and by Roasting and Scrubbing

Type Sand	Screen Analysis							Per Cent on 3 Adjacent Screens	Physical Properties– Standard Permeability	Dry Tensile
	20	30	40	50	70	100	Pan			
New Sharp Sand	....	..	8.6	48.1	39.5	3.1	0.7	96.2	326	218
Wet Scrubbed and Classified (Coarse)	....	..	9.0	48.8	30.0	7.0	5.2	87.8	275	196
Wet Scrubbed and Classified (Coarse) plus 20% New Sharp Sand	....	..	....	....	....	....	....	....	....	189
Roasted and Dry Scrubbed and Classified	....	1.6	8.0	52.0	29.0	6.0	2.6	89.0	346	202
Roasted and Dry Scrubbed and Classified plus 20% New Sand	....	..	....	....	....	....	....	....	....	201

All mixes 100:1 sand-oil mix.

TABLE III—Comparative Properties of New Sharp Sand, Wet Reclaimed, and Roasted and Dry Scrubbed Reclaimed Sand

(Cylinder Block Shallow Jacket Core Sand: Linseed Oil 2.2%, Cereal Binder 1.3%, Water 3.4%)

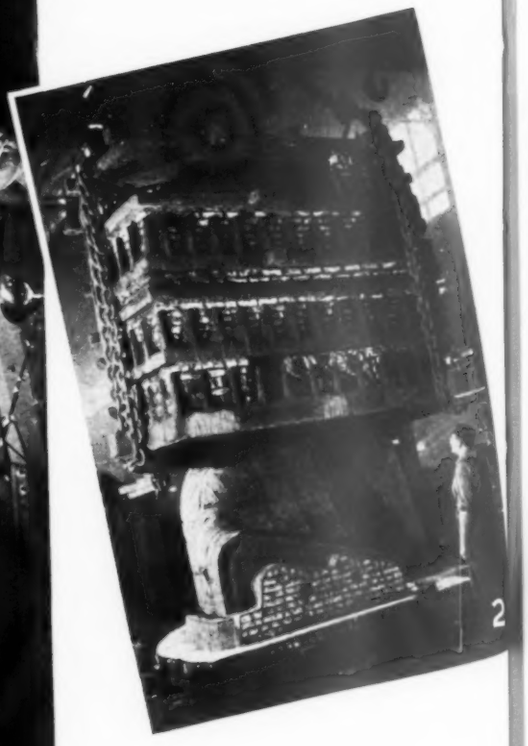
Type Sand	Green Permeability	Green Compression Strength	Dry Permeability	Dry Tensile 2-hr Bake	Dry Tensile 2½-hr Bake
Sharp Sand Control	173	1.2	226	427	430
Wet Reclaimed Sand	146	none	193	350	325
Roasted and Dry Scrubbed Reclaimed Sand	138	1.0	185	403	372

(Cylinder Block Deep Jacket Core Sand: Linseed Oil 1.1%, Cereal Binder 1.3%, Water 3.4%)

Type Sand	Green Permeability	Green Compression Strength	Dry Permeability	Dry Tensile 2-hr Bake	Dry Tensile 2½-hr Bake
Sharp Sand Control	167	0.9	226	275	273
Wet Reclaimed Sand	158	none	193	228	225
Roasted and Dry Scrubbed Reclaimed Sand	146	1.1	205	275	283

Casting

1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Turbogenerator Parts

TWO separate processes, sand molding and loam molding, for casting the low pressure exhaust end cover and the base for an 80,000-kw turbine-generator in the foundry of the Allis-Chalmers Mfg. Co., Milwaukee, are shown in the accompanying illustrations. Loam molding was employed for the exhaust end cover.

The mold for the base was made in sand in one of the casting pits, available in several parts of the floor. The pits are walled in concrete and provided with eye bolts in the side walls for anchoring the cope or covering part of the mold. In this instance, as shown in Fig. 1, the mold taxed the capacity of the pit. The concrete side walls are exposed by the two long side core prints. The upper part of the mold, not shown, was made up of a number of heavily reinforced dry sand cores. The mold was dried by a system set up many years ago in which a small fan drives hot air through the fire in a stove and then through a pipe into the mold. After the interior and exterior cores were assembled, a number of heavy plates were placed on the cores and were held down by blocks and wedges under heavy steel beams extending from side to side of the pit and anchored to the eye bolts, appearing flush with the top of the wall.

Fig. 4 shows the pit mold for one half the base casting after the pattern was removed. Provision was made at each end for the metal to enter the mold through a number of narrow step gates clearly shown in the illustration. The surface of the mold was finished, nailed, black washed and dried. Then the cores were placed in proper position as shown in Fig. 1. The pouring operation shown in Fig. 3 involved three ladles, 40 tons in one and 24 tons in each of the other two. The metal which filled the mold in three minutes was poured at a temperature of 2500 F. This casting, weighing about 65 tons, was allowed to remain in the mold for three weeks before it was stripped and removed to the cleaning room.

Large castings made in the Allis-Chalmers foundry are cleaned in a chamber where a stream of water at high pressure is played all over the surface by an operator who stands on the outside of the chamber and directs the stream of water from the nozzle of a hose pipe projecting into the inside.

The pattern and loam mold for one quarter section of the exhaust end cover are shown in Fig. 2. The mold was built on a heavy cast iron base plate set up level on the foundry floor. A wall was built inside the skeleton pattern and reinforced with three arbors at different heights. The spaces between the skeleton ribs were filled with floor sand and slicked off. A tapered joint area was formed around the outside and extending down to the foundation plate. A loam wall was built on the outside of the pattern. This wall was reinforced by a series of cast iron frames or cages instead of the usual flask. The cope was lifted off, set up on suitable stands, finished on the face and black washed. Cope and drag then were placed in a large drying oven and baked for 158 hours.

To prevent the mold from cracking or warping, the heat in the drying oven was applied slowly and gradually raised to a maximum of approximately 700 F. When an exploratory rod, inserted in one or more of the vent holes in the brick work, came out without any moisture condensation it was apparent that all moisture had been driven off. The mold then was removed from the oven and allowed to cool to a temperature that permitted handling. In some instances, molds of this general character are assembled in pits where the binding equipment is available. In others, as in the present instance, the mold is assembled on the floor and bound together by bolts and stirrup irons.

After the dried mold was assembled on the foundry floor it was surrounded to a depth of 36 in. by steel curbing, and space between mold and curbing was rammed full of sand. Metal to fill the mold was poured from two ladles. The casting was partially stripped and slacked to permit contraction and then was allowed to cool gradually before it was lifted and taken to the cleaning room.

Fig. 1—Pit mold for exhaust end base of large turbogenerator, showing cores being placed in position

Fig. 2—Lifting loam mold off pattern for one quarter section of exhaust end cover

Fig. 3—Pouring base casting weighing about 65 tons. Metal was poured from three ladles and three minutes was required to fill the mold

Fig. 4—Pit mold for turbine exhaust end casting after pattern was removed

Producing CAST IRON

By PAT DWYER
Engineering Editor
THE FOUNDRY

Fig. 1—Match plate flask equipment used to form journal ends of roll in sand. Drag on bottom end of roll with integral gate pockets shown at left, cope on top end of roll at right

Fig. 2—Pit crew pouring heat of small alloy iron rolls from 20-ton ladle

Fig. 3—2-ton air furnace with heat being tapped into ladle

Fig. 4—Sweep molded, shaped pass roll with chill inserts. One half of the completed mold shown

Fig. 5—Mold and pouring box assembly used to top pour cored-out, shaped, piercing dies

ROLLS

BETHLEHEM STEEL CO. operates a special foundry at its Bethlehem, Pa., plant for the production of cast iron rolls in wide variety. Metal for the rolls is melted in two 20-ton capacity air furnaces fired with powdered coal. The capacity represents a normal operating load; on occasion smaller special heats may be melted, while at other times it may be necessary to increase the charge from 10 to 30 per cent. Although the initial cost of this type of firing is rather high compared with other methods, it is claimed that other advantages offset this particular feature and that it provides the best flame control, fastest melting, less oxidation and is the most economical through the use of lower grade coal. The average melting ratio is 1 lb coal to 4 lb iron. A continuous hot, reducing flame is maintained until the metal is tapped.

After the heat has been tapped, the bungs are lifted from the roof and the furnace is allowed to cool. The bottom is patched with silica sand wherever necessary and arranged to present a gradual slope toward the tap hole. The sand then is covered with boards to prevent individual heavy pieces of scrap from gouging holes in the bottom. Materials for the charge are lifted by a crane and lowered through the open roof. Large pieces of scrap rolls first are placed in the center. Pig iron and smaller scrap follows and is so arranged that the flame has free access to each piece, and also has free passage to the side wall close to the bottom leading to the stack outside the building. The bungs are replaced on the roof and the joints are sealed with a thick mud mixture of clay and water.

Raw materials include warm blast charcoal iron, worn-out rolls and the usual foundry and machine shop returns, scrap, heads and gates. The usual ratio for sheet and tin mill hot rolls is 40 per cent pig iron and 60 per cent scrap. Each car of pig iron is inspected carefully, analyzed for chemical and physical properties and stored in a separate pile or bin in the yard spanned by a 15-ton crane. To prevent irregularities possibly present in each carload lot, the pig iron content for each charge contains amounts varying from 5 to 15 per cent from at least four different piles. This method produces a self-perpetuating mixture. When pig iron from a new lot must be used, little actual change is made in the original total charge.

Selection is confined to irons in which the physical properties are normal from normal working blast furnaces. Off pig irons never are used. It is an axiom in chill roll manufacture that the physical properties of the raw materials persist through to the finished product. Grades of pig iron also differ. The charge is made of several lots showing approximately 1.75, 1.25, and 0.50 per cent silicon, respectively. Scrap also is selected carefully both by fracture and chemical analysis. In many instances, of course, the physical properties and chemical analysis of the scrap are known, since the rolls originally were made in this foundry. Each roll as cast carries an identifying mark or number. This number, with accompanying case history, is recorded in the office files.

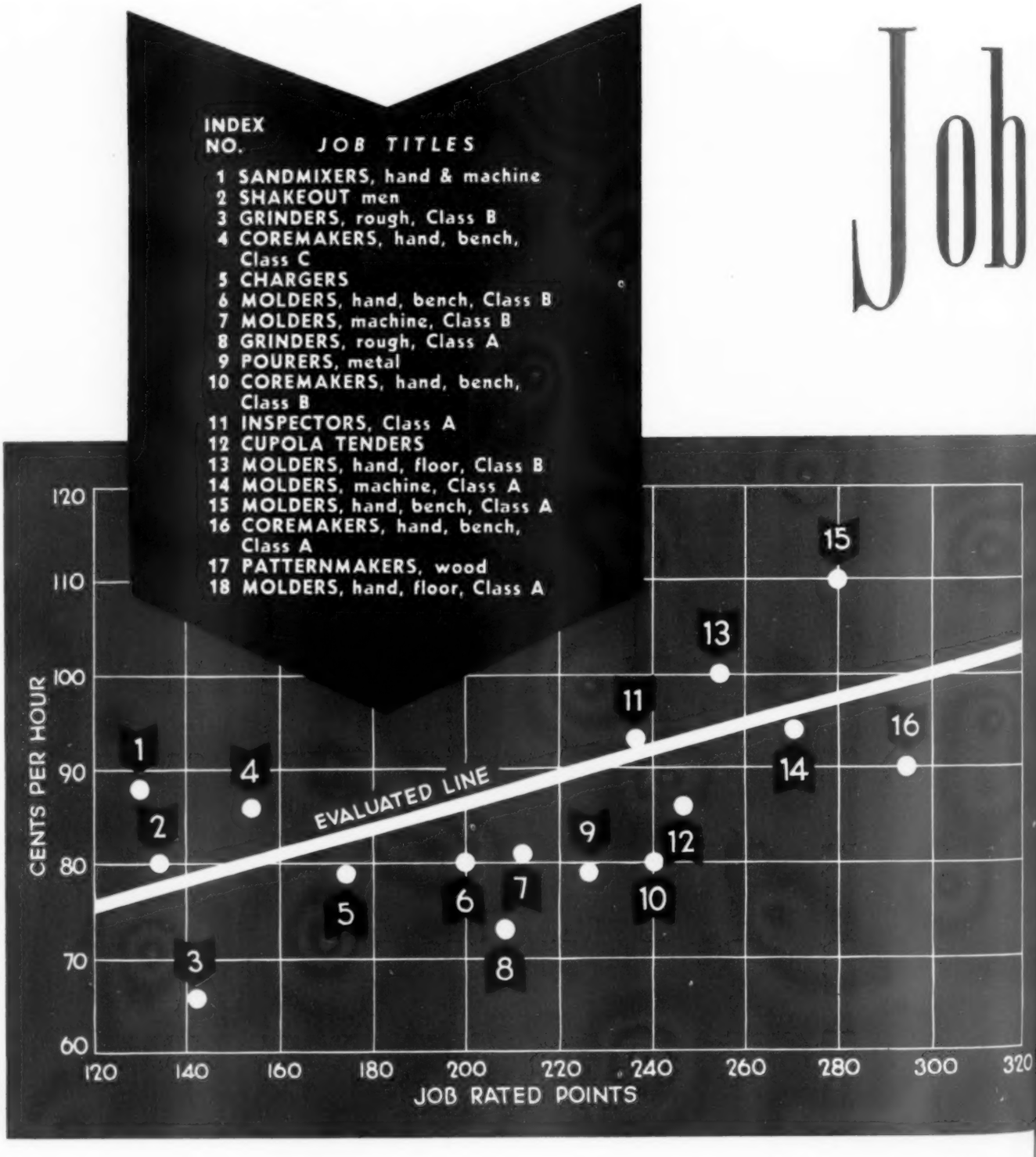
The charge is calculated to the hundredth point decimal and carefully weighed. Usual anticipated melting losses and gain include losses of silicon 0.30 per cent, carbon 0.25 per cent, manganese 0.20 per cent; gain sulphur 0.02 per cent, and no change in the phosphorus content. Total melting loss, including iron, averages 5 per cent. Average weight of sprues and heads on sheet and tin mill rolls is 15 per cent, showing a yield of (*Please turn to page* 224)

JOB evaluation has outgrown its swaddling clothes; today this scientific method for developing a balanced wage structure has become as much a part of running a successful foundry as good machinery maintenance. For one thing job evaluation has enabled countless foundries to line up their jobs in such a way that workers exercising the same skill, effort and responsibility can count on the same base pay. Secondly, through job evaluation the most serious source of turnover and grievances—wage inequities—has been toned down to a hush.

The war gave job evaluation a big push. In the first place, the now extinct War Labor Board required an employer to have a clear-cut system for classifying jobs or be judged "not eligible" on wage increases or decreases. Under such legal restrictions, it was evident that pay scales could no longer be set "by guess or by golly." They had to be accurate.

But War Labor Board regulations couldn't do much about runaway rates. In all industries, there just weren't enough workers to man the jobs and employers were

Job

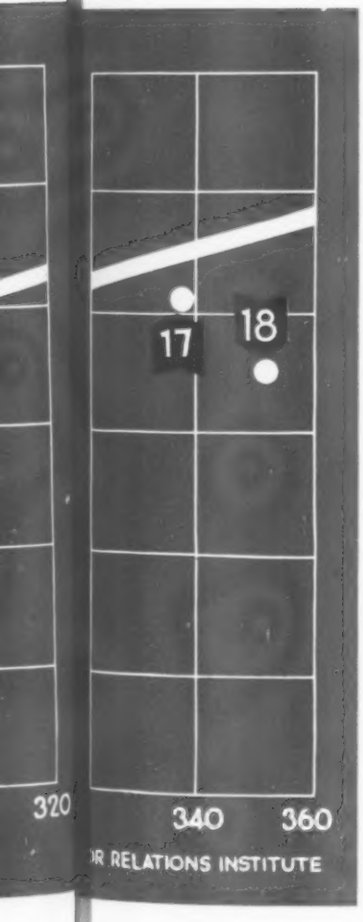


forced to outbid each other in the scramble for labor. The result is that today chippers, coremakers, cupola men and molders, among other foundry jobs, are being paid rates that are out of line in the company wage structure. Nor is the foundry alone in this predicament. Uncomfortable bedfellows are squirming in practically every branch of industry.

Hence the swing of the pendulum towards job evaluation in all types of trades and services. Recently queries from foundry executives about job evaluation have increased sharply, but even more important—only one-fourth of these executives wanting to know more about job evaluation are associated with large companies. The queries showed another thing—foundry management, though willing to give job evaluation a try, still is lost in the tunnel midway between daylight and darkness on what job evaluation is and how it is put to work.

Job Evaluation *in the foundry*

By BURTON BENDINER
Job Evaluation Division
Labor Relations Institute
New York



"Scatter chart" showing newly-evaluated wage rates and current rates in practice before the job evaluation. This system indicates which rates are out of line

While job evaluation renders many long-run advantages in terms of those hard-to-pin-down "intangibles," here are some of the more concrete dollars-and-cents advantages:

Cuts labor turnover: A cardinal labor relations principle for all industry postulates that more workers quit their jobs because they are not satisfied with wage rates than for any other single reason. This is particularly true in the business of manufacturing metal castings. The foundry industry, like many others, has long been hounded by wide discrepancies in going wage rates for key jobs. To any interviewer who has talked to foundrymen in exit interviews, the complaint, "Why should I do the same work as Bill when he gets more money?" strikes a familiar ring.

Lifts below-standard wages: Determining the specific requirements of each job will fit the right man to the right job—and will permit foundries to boost some wages not in line with others while *not increasing unit labor costs.*

Lower unit costs: Once a job evaluation gets going in any business, unit labor costs, it has been conclusively shown, gradually dip.

Picks up worker incentive: Put in a job evaluation and let the worker know exactly how each job is rated—and he'll develop initiative to qualify for those much-coveted higher-rated positions.

Sets rates for new jobs: When new jobs pop up in the foundry job evaluation will have laid the ground for them to fall into line automatically.

Raises employee morale: Job evaluation gets right to the crux of employee dissatisfaction by reducing charges of "company favoritism" to a minimum. Workers doing tasks of the same relative skill, effort and responsibility will be paid the same base rates.

Takes guesswork out of labor costs: Foundries working on a job-lot basis particularly have been plagued by the inability to forecast labor costs due to wide discrepancies in the wage structure. Job evaluation will bring about a nearer-to-accuracy advance prediction of what labor costs will add up to year in and year out.

Distributes wage cuts uniformly: To workers a wage cut is anathema. But should this become necessary under job evaluation, wage cuts will be put through proportionately—allowing a minimum of "humanics" and concentrating instead on "scientifics."

Picks up supervision: Because job evaluation cuts down the central source of employee grievances, the supervisory staff is given more time to manage and is not forced to devote precious minutes trying to iron out a perpetual load of "beefs."

Once you've decided that a job evaluation is sand for your mold it's bad policy to call in the specialist and tell him to put one in before you've laid the groundwork with the employees. Engineering alone doesn't do the trick. It must be mixed with "human relations." And right here the foundry executive is faced (*Please turn to page* 182)

Analysis of the GRAY IRON CASTING Industry

This summary is taken from a report, "Gray Iron Castings—1945," prepared by the Bureau of the Census, Industry Division. The report, covering the industry's 1945 production is available from the Bureau

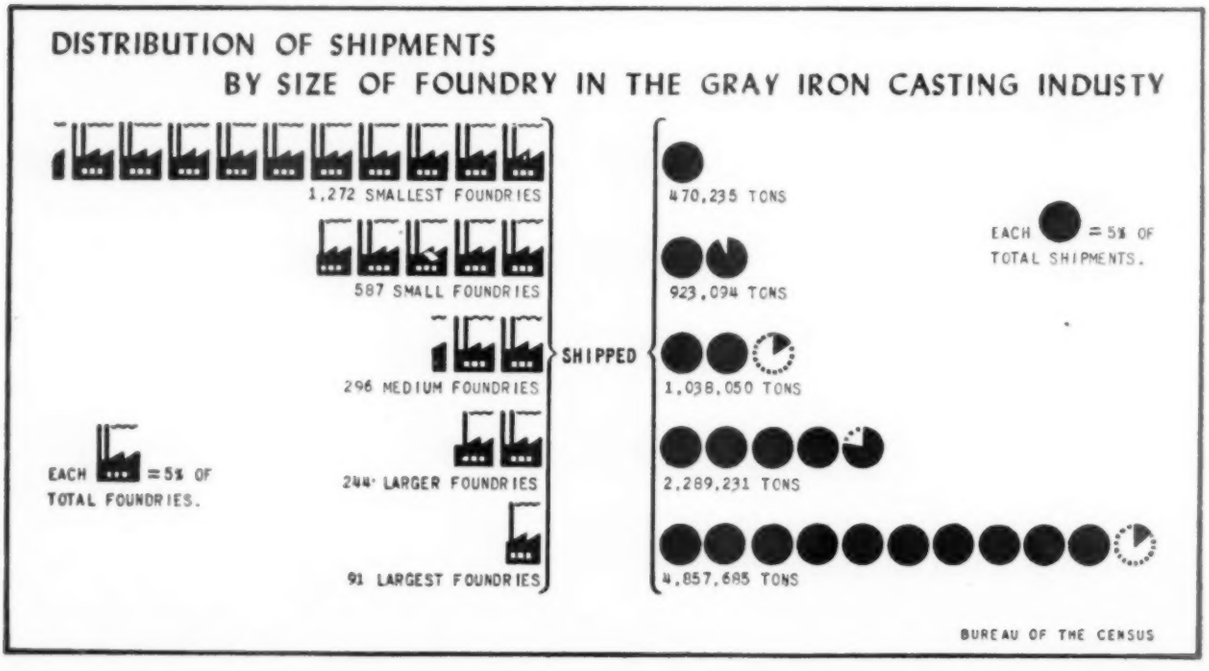
FOR the first time in the industry's history comprehensive data on shipments of gray iron castings have been made available the last two years by the Bureau of the Census of the U. S. Department of Commerce. These figures, released monthly, are an outgrowth of reports compiled originally by the War Production Board during the war. In addition to the monthly figures, the Bureau of the Census recently released a 15-page analysis of the gray iron foundry industry's record for 1945, including a detailed breakdown of shipments and unfilled orders by principal products, as well as a geographical summary of shipments and foundry capacity for the year.

The accompanying chart, taken from this report, illustrates shipments in 1945 by size of foundry and emphasizes the fact that the majority of gray iron foundries are small. Almost 75 per cent of the total of 2490 plants had average shipments of less than 200 tons a month last year and accounted for less than 15 per cent of total shipments. Of the remaining foundries the 91 largest, representing only 3.6 per cent of the total, were responsible for 50 per cent of all gray iron shipments. The bureau's data indicate that approximately one-half of the nation's gray iron foundries contribute only 5 per cent of the industry's tonnage; in 1945 this represented an average of less than 400 tons for each of these smallest plants. Consequently, while the industry commonly is regarded as being made up of some 2500 (*Please turn to page* 214)

Shipments and Monthly Capacity by Type of Casting, 1945

(Short tons)

Product	Shipments During Year		Monthly Capacity December, 1945	
	Quantity	Per Cent	Quantity	Per Cent
Total	9,578,295	100.0	1,568,738	100.0
Molds for heavy steel ingots	1,808,802	18.9	190,130	12.1
Chilled iron railroad car wheels	899,561	9.4	102,963	6.6
Cast iron pressure pipe and fittings	602,663	6.3	140,737	9.0
Cast iron soil pipe and fittings	203,033	2.1	52,618	3.4
All other gray iron castings	6,062,476	63.3	1,082,290	68.9



INSTITUTE of BRITISH FOUNDRYMEN

Meets in annual conference

By VINCENT DELPORT
European Manager
THE FOUNDRY

UNDER the leadership of its president-elect, D. H. Wood, and thanks to the close collaboration of strong organizing committees, the Institute of British Foundrymen held its first full-fledged annual conference since 1939 in Birmingham, the original center of the foundry industry in Great Britain. The conference, June 19 to 21, was an outstanding success featuring many interesting papers, works visits and social events.

The meeting was inaugurated by a reception given Tuesday evening, June 18, in honor of J. W. Gardom, retiring president, and it culminated with a banquet, which nearly 500 members attended, with the lord mayor of Birmingham and C. R. Wheeler, late controller of iron and steel at the Ministry of Supply, as principal guests. While war conditions were still present in the form of food rationing and other difficulties which, on this occasion were successfully met, the spirit that prevailed at the various sessions and events lifted the minds well above purely material consideration.

Formal opening of the conference on the morning of June 19 had J. W. Gardom, foundry consultant, Ripley, in the chair, and started with the annual general meeting of the institute. The annual report showed that membership had attained an all-time record, with 3569 members as of April 30, a net increase of 203 over the total the previous year. Among the honors received by members during the year should be mentioned the award of the M.B.E. (membership of the Order of the British Empire) to Tom Makemson, secretary of the institute, for his services during the war as director of iron castings at the Ministry of Supply; at the banquet Mr. Wheeler also expressed to Mr. Makemson the thanks of the government for his services. The past year was unfortunately marked by a number of deaths, which included five past presidents: J. Hepworth, W. B. Lake, Wesley Lambert, R. O. Patterson and H. Winterton.

Among outstanding publications of the institute during the year were the special report on "The Education and Training of the 'Foundryman' Apprentice and Graduate Entering the Industry" (May, 1945), the first report of the joint committee on sand testing, "Methods of Testing Prepared Foundry Sands," and "Lectures in Foundry Practice" prepared by members of the Education Committee. The annual report mentioned that the Mond Nickel Co. Ltd. had offered through its chairman, Dr. W. T. Griffiths (now Sir W. T. Griffiths) a sum of £50,000 ($200,000) to be donated during the next seven years for the provision of fellowships in metallurgy. In its reference to relations with kindred associations the report recorded the council's warmest congratulations and good wishes to the American Foundrymen's Association on the attainment of its 50th anniversary.

D. H. WOOD
President
Institute of British Foundrymen

Following presentation of the annual accounts by C. W. Bigg, honorary treasurer, the report of the Technical Council was presented by its chairman, P. A. Russell. The following headings give an indication of the work done by the council's subcommittees during the year:—Gray Iron Test Bar, Malleable Cast Iron Specifications, Control Tests for Cast Iron, Mold Materials for Iron Castings, Atlas of Defects in Castings, Basic Cupolas, Gases in Cast Iron, Dimensional Tolerances for Castings, Testing of Oil Sand, Light Alloy Test Bars, Cast Iron Specifications.

Presentation of the annual awards was made by the chairman as follows:

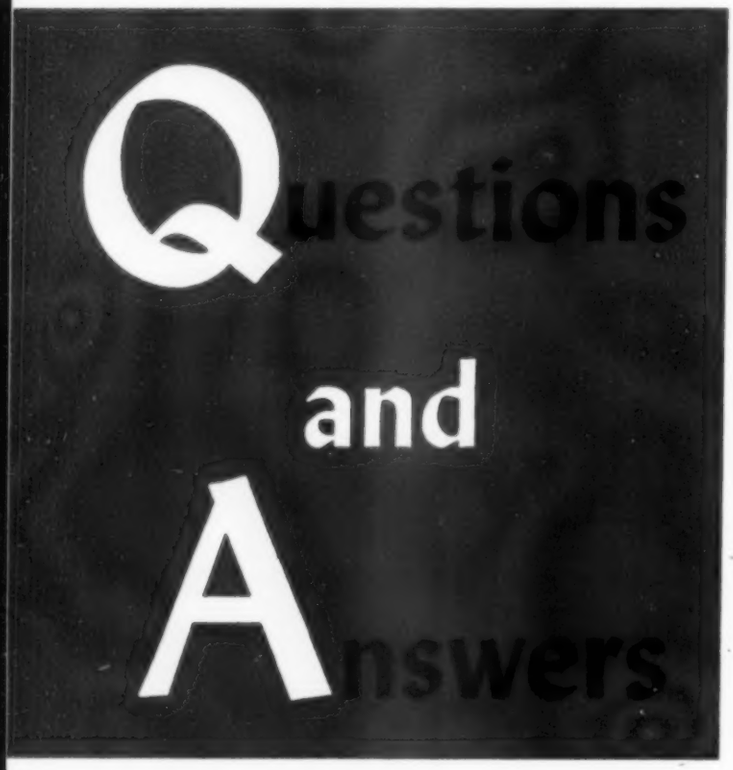
The Oliver stubbs gold medal to A. Phillips, Metropolitan Vickers Co. Ltd., Manchester, for the services he had rendered to the institute and the industry since he was elected a member in 1922; he contributed many papers and did much work on the test bar recommended to the British Standards Institute; he has been for many years a member of the Technical Council and is a past president of the Lancashire branch.

The E. J. Fox gold medal to Sir Lawrence Bragg F.R.S., professor of physics at Cambridge University and head of the Cavendish laboratory. Mr. Fox, who presented the medal himself, referred to Sir Lawrence's pioneer work in the discovery and development of x-ray detection methods to (*Please turn to page* 197)

Describe Sash Weight Molding

Q.—We shall greatly appreciate any special bulletins or other special literature you may have on the best and most economical way to make sash weight castings.

A.—Many years ago we published a series of articles describing the various methods adopted for the production of sash weight castings. Unfortunately, we have no back copies of these issues. A brief reference may serve your present purpose. Obviously, in any given instance the best method to adopt will depend to a great extent on local conditions, particularly on the total volume to be handled.



1. From six to eight split wood patterns are mounted on both sides of a matchplate, which may be wood, iron or aluminum. A single sprue at one end delivers metal to a long runner extending across the drag face and connected to each casting by a small gate. The molds may be rammed by hand or on a squeezer machine. The main disadvantage of the method is that a board and patterns must be available for each size.

2. A set of solid patterns is laid in a follow board on which the drag is rammed and rolled over. The follow board is removed and the cope is rammed on the drag in the usual manner. Between certain limits, several size patterns may be used with the board.

3. Several patterns are mounted on end and the mold is rammed either by hand or on a jolt machine. The cope is rammed either directly on the drag, or on a separate board. Instead of the usual eye for the cord, a small steel loop is bedded in the cope of each casting.

4. Permanent molds, either plain or water-cooled, have been employed for making sash weight castings. The molds are set up in straight lines or on a revolving platform to permit pouring at one station.

5. Where the castings are made in great volume, two or three sets of patterns are placed horizontally in a drag in staggered formation. Sand is rammed around them, and then the lowest row of patterns is pulled through openings in the end of the flask and inserted again higher up. The process is repeated until the flask is filled to the top. The patterns are lengths of steel pipe with one end drawn to a point which rests in a small hole in a thin steel plate set up near one end of the flask. Later the opening left by the plate serves as a gate to all the castings. The open ends are stopped with the eye cores.

Air Needed for Small Cupola

Q.—We shall appreciate any comment on a cupola we are building: 30 in. outside diameter; 21 in. inside diameter; total height from foundation plate 20 ft; charging door 8½ ft from foundation plate; four tuyeres 3 x 6 in., flared to 12 in.; windbox 6 x 20 in. What is the proper size blower and motor for a cupola this size? Construction has been based on material from *Melting Iron in the Cupola* by J. E. Hurst.

A.—Mr. Hurst is a pretty good guide to anything connected with the cupola, theoretical or practical. Height of the charging door or total height of the stack have little or no effect on the cupola efficiency. Since presumably the cupola will be hand charged, the lower charging door sill should be flush with the charging floor. This will reduce the labor of throwing material into the cupola. On a large cupola it is advisable to have the door sill extending 10 or 12 in. above the floor to serve as a guard rail to prevent unwary helpers from falling through the door, but that danger may be discounted in the small size.

Total height of the stack depends on the height of the roof. A hood, or smoke and spark arrester should be mounted on the top of the stack, except in areas where this item does not constitute a menace, or conflict with local town or by-laws. Maximum melting speed of a cupola 21 in. in diameter and operated properly is 3463 lb per hour, with a consumption of 700 cu ft of air per minute at a pressure of 6 to 8 oz. A 5-hp motor will serve with a power consumption of 5 kwh. A suitable charge consists of 500 lb pig iron and scrap, 60 lb coke and about 15 lb limestone. For short heats, 1 hour or less, it is not necessary to slag the cupola. For long heats the slag must be drawn off to keep the cupola clean.

Copper Has High Conductivity

Q.—We want to secure a practically pure copper alloy for sand castings which must have high electrical conductivity, and be much harder than pure copper. In cast form it must have characteristics more like hard rolled copper bars. It has been suggested that 1 per cent Cd will produce the desired qualities, and we would like to know if there is any published information on the alloy and the method of manufacture. If there is some other alloy which will fulfill the requirements, we will appreciate the information.

A.—At present a number of copper-base alloys on the market are claimed to meet the requirements you mention. All are precipitation hardenable type alloys in which the high strength and hardness result from the precipi-

tated particles, and the high conductivity from the small amounts of alloying material left in solid solution. A wide variety of alloying materials are added to copper to provide those characteristics and include chromium and silicon; nickel and silicon; cobalt and silicon; nickel or cobalt and beryllium; chromium and beryllium; chromium and silver; chromium and cadmium; etc.

So far as we know these are patented alloys, and information as to details of use, manufacture, etc. will have to be obtained from the patent holders.

Find Leakage at Thread Base

Q.—We are sending for your examination some automatic-acting globe valves made of the 85-5-5-5 alloy with 2½ per cent Ni shot added. We find that the valves show a slight leakage near the base of the male thread on the extension or boss at the top of the valve. Can you tell us how to overcome the trouble?

A.—Without any information on the method of molding, it is hardly possible to give a forthright answer on how to eliminate the leakage. However, we suspect that the trouble arises from a combination of gas absorption and lack of feed. Presumably the boss or extension is made solid and bored, turned and threaded on automatic machines. Also it appears that the gate enters the cavity at one of the other openings at right angles to the boss.

Since the boss section is so much heavier than the rest of the valve, it is the last to freeze, and unless a suitable riser is placed to feed that section, there is a possibility of lack of feed. Again in heavy metal sections where gas is present, the gas tends to come out of solution, coalesce and form small holes. However, where the metal freezes rapidly the gas is held in solution.

Careful examination of the machined surfaces under a low-power magnifying glass reveals some of the small holes or pits but not too many, so it is quite possible that a revision of gating and risering may correct the trouble. Our suggestion would be to gate into the boss using an open or sizable blind riser on the runner between the pairs of castings on opposite sides. Gate into the casting should be large enough to prevent freezing off, or a neck-down core could be placed at that point to provide a hot spot, and insure easy removal.

Producing Aluminum Castings

Q.—We are operating a small aluminum foundry for making patterns, etc., and expect soon to expand, and would like some information. We now are melting with two oil-fired furnaces using 25-lb pressed steel, bowl ladles for melting and pouring. Most castings are poured at 1250 F. Since the expected work will be more difficult than patterns we would like information on pouring temperatures, feeders, chills, etc. Should scrap be omitted on matchplates?

A.—You do not mention whether you will have to melt larger quantities of aluminum than can be handled by your present procedure, but presumably that will occur. Therefore, you will have to use iron pots or graphite or silicon carbide crucibles of sufficient size. With cast iron pots the molten metal will have to be dipped out and placed in the pouring ladles unless tilting type furnaces are installed. Crucibles can be lifted from the furnace and carried to the mold side. As you undoubtedly have had considerable experience with aluminum alloys, you know that care has to be taken to prevent absorption of gas. Metal should not be heated much above the temperature required for pouring, say 50 to 100 F, just sufficient to permit skimming and carrying to the mold side. Degassing the metal may be accomplished with gaseous fluxes such as dry chlorine, nitrogen or boron tetrachloride, or with any of the dry powder fluxes available from a number of makers.

Without knowledge of the type of castings you are going to make it is difficult to make any concrete recommendations on gating, molding, etc. Main essential is to see that the molten metal enters the cavity without turbulence. Sprue, runners and gates should be planned to provide a smooth flow. Usually multiple gating is preferred to a single gate which permits a lower pouring temperature. To provide smooth flow the runners generally have a larger cross-sectional area than either sprues or gate. Chills are employed to promote progressive solidification, that is to say to start solidification at the remotest point from the gate or riser and proceed progressively to the risers which still contain liquid metal.

Pouring temperature will depend, as you already know, on section thickness and intricacy of the casting, and will range from 1250 to 1350 or 1375 F, and in some cases around 1400 F with thin, rangy castings. Best method is to pour at various temperatures and select that temperature which will give castings without cold shuts. We suggest that you use a pyrometer for determining temperature of metal in the crucible both in the furnace and at pouring time. Its use will save many castings as well as arguments. So far as use of scrap is concerned, we do not believe that any trouble should be encountered as long as you are employing return scrap of the same composition (assuming you may be using several alloys).

GANGWAY!

By J. A. Patterson

"Hmm! I wonder where th' boss got this last sand."

Wants Data on Permanent Molds for Aluminum

Q.—We will appreciate a list of books or other forms of literature covering methods of producing and operating permanent molds for casting aluminum alloys.

A.—Up to the present we have not seen a book devoted exclusively to the subject of making aluminum alloy castings in permanent molds. *Die Casting Practice*, by Marc Stern, and *Die Casting* by Herbert Chase, touch on the subject to some slight extent, but the books primarily deal with methods and equipment for injecting the metals under pressure. From the general character of your inquiry we assume that you are interested in molds where the metal is poured by gravity. Papers on the subject have appeared in THE FOUNDRY and other technical publications. The greater part of Chapter XIX in the book *Gates and Risers for Castings* by Pat Dwyer is devoted to construction and operation of permanent molds for aluminum alloys.

An extensive treatise by John Vickers on design, construction and operation of permanent molds in the Rolls-Royce foundry in England was presented at the Buffalo convention of the American Foundrymen's Association two years ago. This paper is incorporated in the *Transactions* of the association Vol. 52, and in the February and March, 1945 issues of THE FOUNDRY. This article is the most complete to come to our attention. The June, 1946, issue of THE FOUNDRY contains an article by Maj. Jack W. Wheeler on "Vacuum Permanent Mold Castings."

Aluminum Match Plates Cast under Pressure

Q.—Please advise us as to the materials and methods used in the making of aluminum pressure cast matchplates.

A.—Your request for information on making pressure cast matchplates covers such a wide territory that we can only touch on the generalities of the subject. Some of the phases have been described in the literature, and we suggest that you study "Pressure Casting Aluminum Matchplates" by J. P. Callahan which appeared in the July, 1945 issue of THE FOUNDRY in addition to the following information.

Material used for matchplate molds and molds for other castings is a mixture of plaster of paris or gypsum cement and fibrous talc. These are mixed in the dry state in the ratio of four parts by weight of plaster to one of talc. After thorough mixing the combination is poured into water in the ratio of 1 lb to 1½ lb of water. The liquid mixture is stirred until it assumes a creamy consistency, when it should be poured around the pattern.

First operation in preparing the mold is to establish the parting lines on the pattern. Then the pattern may be set up on a wood follow board to the lowest parting and modeling clay used to build the board up to the remainder of the parting, or a block of plaster may be used to form the follow board by digging out a depression for the pattern to rest in, and using modeling clay to build it up. Built-up portion should not be too steep since in the final plate that may leave sharp edges of sand which are easily broken off.

A flask consisting of two L-shape wood sections is placed around the pattern and follow board and clamped. It should be mentioned that previous to these operations the various parts are coated with a wax-oil compound to prevent plaster from adhering to them. The liquid plaster or gypsum is then poured into the flask and allowed to set or become solid. The flask is unclamped and the mold removed from the pattern. If the pattern is small and a number of them are to be mounted on the plate, the individual molds are termed piece molds, and the desired number can be made according to the previous description. However, if desired, a plaster master may be made from the first piece mold by placing it in a flask and pouring in plaster, and that master may be used for making the remaining piece molds. The other half piece mold is made by placing the pattern in one of the first molds produced. Pattern and mold are placed in a flask and plaster poured in. Other piece molds may be made by that procedure, or a plaster master may be made as described previously.

Next step is assembly of piece molds to make the cope and drag sections of the complete mold for the plate. All the piece molds have previously been scored or grooved along the four edges. As may be noted the first set of piece molds has parallel faces top and bottom because it was designed that way. These molds are placed cavity down on a glass topped assembly bench and arranged in the desired relationship. A frame is placed around them and the plaster poured in. After the plaster is set the mold is rolled or turned over to bring the cavity side up. Plaster patterns made from a set of the piece molds are now placed in the various cavities. Then the other half piece molds are located in position, a frame placed around them and plaster poured in. Integrated molds are placed in an oven and dried at 600 F for 12 hr.

Drag mold is placed on a flat cast iron bottom board, and the separator or thickness sheets of asbestos board laid around the edges. The cope is set in place, followed by a cast iron top plate. The whole is clamped together. A thin piece of asbestos paper 1/32-in. thick is placed over the sprue, the reservoir clamped into position and filled with molten metal. A cap connected to the compressed air line is placed over the reservoir, and the valve opened to supply 5 to 10 psi which forces the metal into the mold cavity.

Gating and Molding Cause Defects in Casting

Q.—We are sending to you a hollow pedestal casting about 12 in. long and 2¼ in. in diameter at the largest point and the runner and gate for it. This is made of No. 1 yellow brass and about three-fourths of our pourings on this size and other sizes show laps or cold shuts and pitted surfaces. We have tried varying the pouring temperature from 2100 to 2300 F without success. We are using No. 1 molding sand.

A.—The defects appearing on the pedestal casting submitted for examination result from two causes. The pitted or pock marked surface is caused by sand grains being washed along with the metal stream and finally coming to rest at various points along the cavity.From the appearance of the casting at the points where the gates are attached and at various sections along the joint line, we believe that the sand is broken off along the edges when the mold is closed. One way to determine whether that is the case or not is to close the mold in usual manner, and then carefully lift the cope off using pins to get a straight lift, and examining the cavity and edges for loose sand. Possibly your sand is low in bond strength.

The cold shut or lap, in our opinion, is due primarily to the small gate employed at the large diameter of the casting opposite the point where the cold shut appears. The metal flows down the sprue to the runner, enters the first gate on the narrow diameter and flows along the runner to the gate in question. Some heat is lost in the travel, and in addition more is lost in travelling under and over the core. With the small gate area the metal travels comparatively slowly, and loses heat faster than with a larger gate area. Consequently, our suggestion is to increase the thickness of the gate to approximately double the present dimension.

Yellow brass must be pushed into the mold cavity as rapidly as possible, and for that reason the gating system must be larger than for red brass. Your runner appears to be plenty large enough, and it merely means increasing the gate size so that the metal can arrive quickly in the cavity. Perhaps raising the sprue end of the mold might help also. This is common practice in brass shops. Molds are placed on a slanting stand.

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MEN of Industry

GEORGE K. DREHER

FRANK E. SHUMANN

GEORGE K. DREHER, recently vice president in charge of manufacturing and works manager, Ampco Metal Inc., Milwaukee, has resigned to accept the position of vice president and general manager, Rogers Pattern & Foundry Co., Los Angeles. Mr. Dreher attended Lawrence College, Appleton, Wis., joining Ampco Metal in 1930 where he served successively as foreman, supervisor, superintendent and plant manager. He was president of the Wisconsin Chapter of the American Foundrymen's Association from 1942 to 1944 and is now serving as a director of the national association. He is a former chairman of the Milwaukee Chapter of the American Society for Metals.

• • •

Frank E. Shumann, recently elected president of the Malleable Founders' Society and chairman of its board of directors, is president, Lehigh Foundries Inc., Easton, Pa. A graduate of Rensselaer Polytechnic Institute, Mr. Shumann, was vice president of the Albany Malleable Iron Co., Voorheesville, N. Y., from 1924 to 1930, when he joined Lehigh Foundries in the same capacity. He was elected president of the latter company in 1933. He has a notable record of war supporting activities including the chairmanship of the Industry Integration Committee for the 60 mm mortar shell. In 1943 he was cited by the Army Ordnance Department for his contribution to vital war production and the program to conserve critical material and machines, in which his company brought many new uses for malleable iron in products used in the prosecution of the war.

• • •

Douglas J. James, formerly assistant foundry superintendent, Erie City Iron Works, Erie, Pa., has been appointed superintendent of the Grove City, Pa., foundry, Cooper-Bessemer Corp., succeeding **George Johnstone Jr.,** who resigned recently. Mr. James, a graduate of Grove City College, began his foundry career with Latrobe Electric Steel Co., Latrobe, Pa. He joined Erie City Iron Works in 1941, and after working in the foundry to gain practical experience, was made assistant superintendent. He is a director and treasurer of the Northwestern Pennsylvania Chapter of the American Foundrymen's Association, of which he was one of the founders.

• • •

W. Frank Kelly has been appointed general superintendent of foundries, American Manganese Steel Division, American Brake Shoe Co., with headquarters in Chicago Heights, Ill. Mr. Kelly, who was formerly works manager of the American Manganese Steel Division plant in New Castle, Del., has been associated with the division since 1925.

• • •

Robert E. Belt has retired as secretary-treasurer of the Malleable Founders Society, Cleveland, after thirty years of continuous service in that capacity with the society and its predecessor organizations. Mr. Belt was graduated from Ohio Northern University and National University Law School. Later he qualified as a certified public accountant, and for

(*Continued on page* 104)

DOUGLAS J. JAMES

W. FRANK KELLY

ROBERT E. BELT

WOODWARD IRON COMPANY

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(*Continued from page* 102)

two years was in charge of the division of uniform cost accounting, Federal Trade Commission, Washington. During his association with the malleable societies he has greatly increased their scope of activities along the lines of uniform methods of cost accounting, collecting production data designed to reduce costs, standardizing operating processes and practices and in improving the quality of malleable castings. Mr. Belt has contributed many articles to the technical press and at technical meetings. He is also the author of the book *Foundry Cost Accounting*.

♦ ♦ ♦

William A. Hambley has resigned as chief metallurgist, foundries and pattern division, Allis-Chalmers Mfg. Co., Milwaukee, to become general manager of both the Slinger Foundry Co., Slinger, Wis., and the foundry division of the Falls Mfg. Co., Menomonee Falls, Wis. Mr. Hambley, an honor graduate of Queen's University in 1923, spent 12 years with Studebaker Corp., South Bend, Ind., and was chief metallurgist of its foundry division prior to his joining Allis-Chalmers in 1938 as assistant to **Ralph MacPherran**. Upon the latter's retirement a year later, Mr. Hambley became foundry metallurgist; he was made superintendent of the research, chemical and metallurgical laboratories in 1941, and chief metallurgist of the foundries and pattern division in 1946. An active member of the American Foundrymen's Association, he is serving on the executive committee of the Gray Iron Division and is chairman of the division's Committee on Analysis of Casting Defects. He has held various offices in the Wisconsin Chapter, AFA.

♦ ♦ ♦

Roy L. Salter has been appointed vice president of Southern Wheel Division, American Brake Shoe Co., New York, in charge of operations of its nine plants in the production of chilled tread car wheels. Mr. Salter was graduated from Alabama Polytechnic Institute, and joined Southern Wheel in 1924, as assistant foreman at the Savannah, Ga. plant, subsequently serving in a supervisory capacity at wheel plants in Portsmouth, Va., and Sayre, Pa. From 1937 to 1942 he was in the services of the Association of Manufacturers Chilled Car Wheels, on leave of absence from Southern Wheel, and returned to New York as general superintendent in 1942. He was made works manager of the Southern Wheel Division in 1944.

♦ ♦ ♦

R. Lynn Ogden has been appointed a senior engineer, Lester B. Knight & Associates, Chicago. Mr. Ogden has had 37 years of experience in the foundry industry, having been with Stockham Pipe Fittings Co., Birmingham, for 34 years, where he began as a coreroom foreman and resigned in 1943 as general superintendent of the gray iron, malleable and brass foundries. He joined American Castings Co., Birmingham, later known as Jackson Industries Inc., in 1944, as plant manager. For the last year he has been associated with National Foundry Co. of New York Inc., as plant superintendent in charge of modernization of a production jobbing gray iron foundry. Mr. Ogden is a charter member of the Birmingham Chapter of the American Foundrymen's Association, which he has served as vice chairman and as an active member of various committees.

♦ ♦ ♦

Henry C. Winte, newly elected chairman of the Western New York Chapter of the AFA, is works metallurgist of the Worthington Pump & Machinery Corp., Buffalo. He was graduated from Michigan State College in mechanical engineering in 1931 and joined the foundry industry as melting foreman with the Saginaw Malleable Iron Division. Mr. Winte later held a similar position with Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., and in 1936 joined Fairbanks, Morse & Co., Beloit, Wis., as foundry metallurgist. He was appointed to his present position with Worthington in 1941. A past technical secretary and vice chairman of the Northern Illinois and Southern Wisconsin Chapter of the AFA, Mr. Winte has been active in the Western New York Chapter for a number of years, serving as vice chairman in 1945-1946.

♦ ♦ ♦

Davis L. James Jr., for the last five years industrial engineer, Crucible Steel Co. of America, Harrison, N. J., has been appointed industrial engineer for the High Bridge, N. J., and Easton, Pa., plants of Taylor-Wharton Iron & Steel Co. A graduate of University of Cincinnati in 1917, he studied mathematics and science at the Sorbonne, Paris, in 1919 and later took courses in business administration and economics at the University of Cincinnati in 1920. His experience in industry has been wide and varied.

♦ ♦ ♦

Phil H. Neal has been made president, Alabama By-Products Corp., Birmingham, succeeding **John W. Porter**, who has retired. Mr. Porter became a director of the company in 1932, and its president in 1935. Mr. Neal attended the University of Illinois and has been associated with Alabama By-Products since it was organized in 1920. He became vice president in April, 1945, and was made assistant to the president in September of that year.

♦ ♦ ♦

C. H. Morse III has been named vice president in charge of manufacturing, Fairbanks, Morse & Co., Chicago, succeeding **A. E. Ashcraft**, who has retired after 44 years with the company. **Henry Haase** has become general manager of the company's Beloit, Wis. works, suc-

(*Continued on page* 108)

WILLIAM A. HAMBLEY

ROY L. SALTER

R. LYNN OGDEN

HENRY C. WINTE

ELECTRIC TRUCKS
PALLETIZED LOADS
PHILCO BATTERIES

It's the Dollars they Save that Counts!

Now that wide experience with palletized unit loads has proved battery-powered electric trucks the most flexible, safe, cost-saving equipment for handling materials and finished goods—make this knowledge pay off! Go the whole way by powering your electric trucks with the amazing new Philco "Thirty", the high capacity battery that gives 30% longer life! It will save you money. Write for the new Philco "Thirty" catalog.

Philco Corporation, Storage Battery Division, Trenton 7, New Jersey

PHILCO FOR 50 YEARS A LEADER IN
INDUSTRIAL STORAGE BATTERY DEVELOPMENT

250 cast crankshafts cleaned hourly in this *Wheelabrator* monorail cabinet

Pushing through a quick changeover from cast shells to automobile crankshafts, Auto Specialties Manufacturing Company of Benton Harbor ran into a major cleaning problem. Equipment which had proved so highly effective for cleaning shells in war was unsatisfactory for cleaning crankshafts due to the manual handling and excessive cleaning time required to remove all sand and scale.

American Engineers, answering the distress signal, made a thorough investigation of production requirements, density of sand and scale and handling methods.

NOW . . . the Wheelabrator Special Cabinet, which they designed, cleans more than 75 tons of crankshaft castings in less than eight hours. In only one pass through this Wheelabrator Cabinet all the sand from the green castings or heavy scale from the annealed shafts is completely removed. 250 shafts are cleaned every hour.

A heavy duty Monorail Conveyor System carries the castings from the shakeout to and through the Wheelabrator Cabinet. Four Wheelabrator Units, each throwing more than 300 pounds of abrasive per minute, are staggered at carefully determined heights in the cabinet to give complete blast coverage to all parts of the work. The castings are rotated within the abrasive field to further insure that all surfaces of the shafts are thoroughly cleaned.

The Special Cabinet and Conveying System has reduced the manual handling of castings to a minimum, it has resulted in more thoroughly cleaned castings and it has kept pace with all production goals.

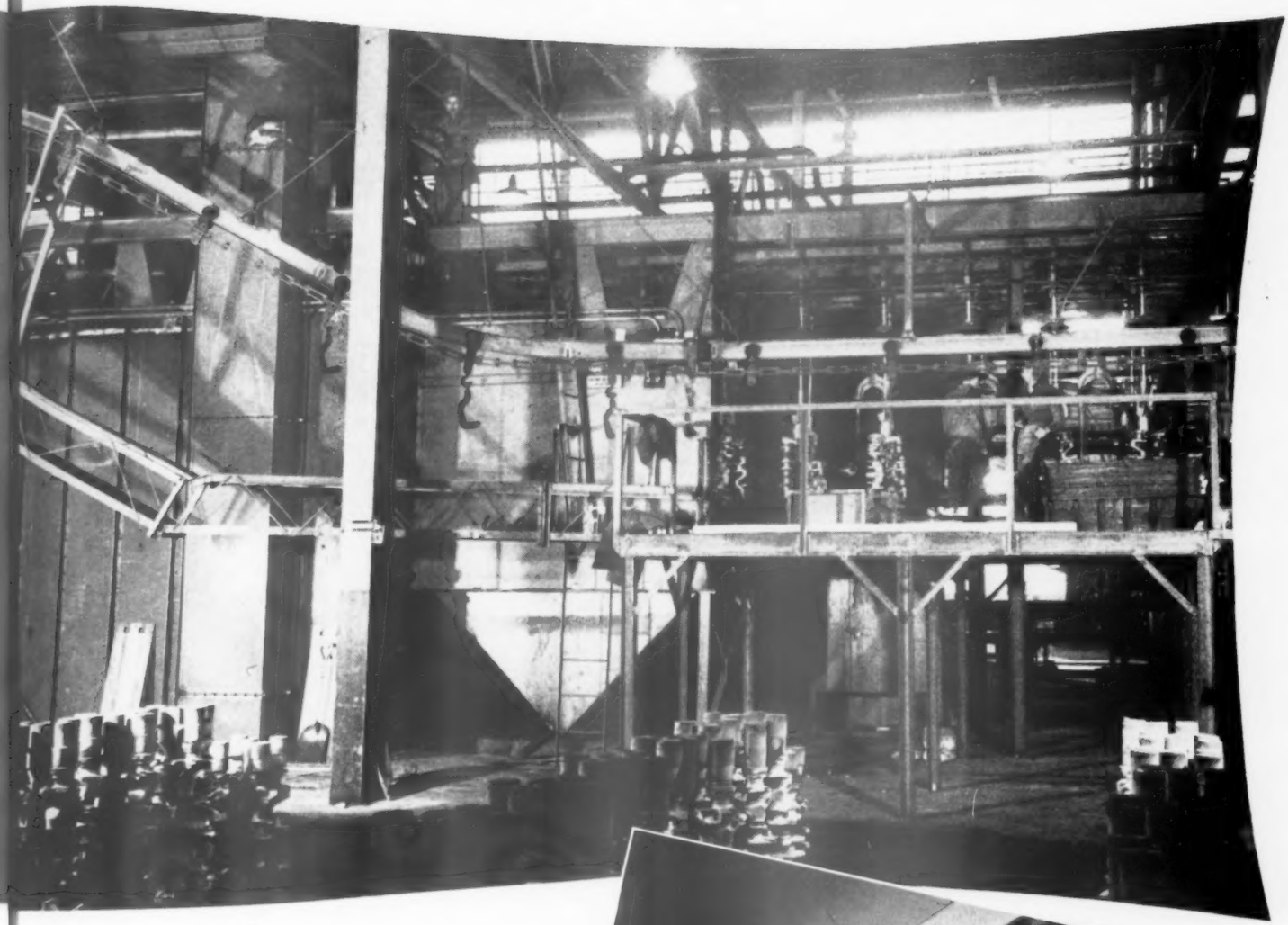
American Engineers will solve your cleaning problems too. They will be glad to give you the benefit of their recommendations without the slightest obligation to you.

D165

The Answer To Your Problem

The most efficient and economical way to handle your cleaning problem can be determined by sending products to our laboratory, where equipment of all kinds is available for testing purposes. Avail yourself of this service today—doing so involves no obligation whatever.

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQU



The Wheelabrator Monorail Cabinet which is cleaning cast crankshafts at the rate of 250 an hour. The loading and unloading station is at the right in the picture.

The interior of the Wheelabrator Cabinet showing the relation of the crankshafts to the four Wheelabrator units. The abrasive blast of the Wheelabrator units thoroughly covers all surfaces of the crankshafts.

THE AMERICAN MOLDER

American

FOUNDRY EQUIPMENT CO.

305 S. BYRKIT ST. MISHAWAKA, INDIANA

HAROLD L. ULLRICH

ANTHONY STIMMLER

GEORGE C. TOLTON

MITCHELL P. CHRISTENSEN

(*Continued from page* 104)

ceeding **A. C. Howard**, who has resigned after 30 years of service.

♦ ♦ ♦

Harold L. Ullrich, recently elected chairman of the Metropolitan Chapter, American Foundrymen's Association, is works manager, Sacks-Barlow Foundries Inc., Newark, N. J., with which company he has been associated since 1926. He is a graduate of Pace Institute, New York.

♦ ♦ ♦

American Foundry Equipment Co., Mishawaka, Ind., has announced a number of sales territorial changes and appointments. **George C. Tolton** has been appointed sales representative for the northwestern states, with headquarters in Seattle. Mr. Tolton has been in the Seattle area for several years with the Bureau of Yards and Docks, U. S. Navy, and prior to that was with the Austin Co., Cleveland. Previous connections included American Radiator & Standard Sanitary Corp., Continental Diamond Fibre Co., and the Great Northern Railroad. **Anthony Stimmler** will represent the company in the new Minneapolis sales office. Mr. Stimmler has been engaged in sales engineering for the mechanical division of General Mills Inc., Minneapolis, for many years. **Mitchell P. Christenson** has been named sales representative in the new Denver territory, with headquarters in that city. During the war Mr. Christensen served as principal metallurgist and assistant chief of production in a branch of the Chicago Ordnance District. Earlier associations included the Rock Island Arsenal, Rock Island, Ill., and R. Lavin & Sons, Chicago.

♦ ♦ ♦

Herbert E. Cragin Jr. has been appointed superintendent of the High Bridge, N. J., plant of Taylor-Wharton Iron & Steel Co. Mr. Cragin was graduated from Princeton University and joined the company in 1934. He resigned as foundry manager when he joined the Navy in 1943 where he served in the Welding, Casting and Forging Section, Bureau of Ships. He was in charge of a projected steel and iron foundry at the Okinawa Naval Ship Repair Base when the war ended. **Robert McEldowney Jr.** has been appointed assistant to Mr. Cragin at the High Bridge plant. Mr. McEldowney, also a graduate of Princeton University, became associated with the company in 1941. He joined the Marine Corps in January, 1943, returning to Taylor-Wharton following his release from active duty in March with the rank of captain.

♦ ♦ ♦

J. C. Vignos and **R. L. Cunningham** have been elected vice presidents, Ohio Ferro-Alloys Corp., Canton, O. Mr. Vignos, associated with the company since 1929, as chemist and research director, has been general sales manager for a number of years.

♦ ♦ ♦

George A. Ellinger has been appointed chief of the optical metallurgy section, Bureau of Standards, Washington. Mr. Ellinger, a graduate of Pennsylvania State College, has been with the bureau since 1929, specializing in co-operative work with the Navy Department on the development of welding processes and technique for the fabrication of ships and

(*Continued on page* 110)

HERBERT E. CRAGIN Jr.

ROBERT McELDOWNEY Jr.

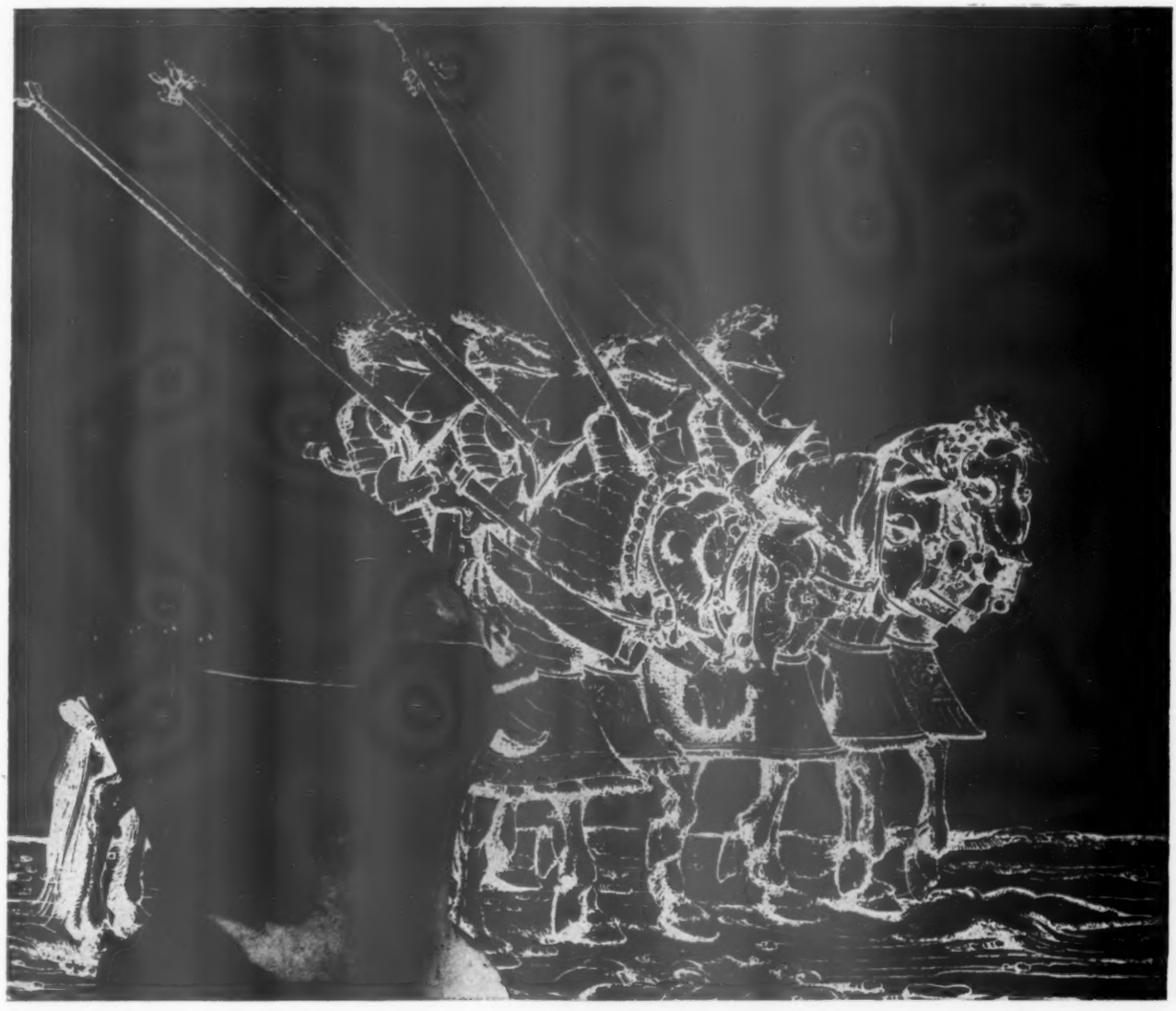
J. C. VIGNOS

R. L. CUNNINGHAM

MATERIALS MAKE PERFORMANCE

Several centuries ago the Chevalier de Roye swept the tournaments until a broken saddle girth made him non-operational. A promising career was ruined by a material weakness missed by routine inspection.

Temper brittleness in cast steel is a modern material weakness that is easily overlooked, and likely to be fatal to product performance and sales. The addition of molybdenum to cast steel will eliminate this risk—and the steels will do the job well and economically.



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CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

Climax Molybdenum Company
500 Fifth Avenue • New York City

MOLY

(*Continued from page* 108)

accessory equipment. **Harold E. Cleaves** has been named chief of the chemical metallurgy section of the bureau. He was graduated from the University of Washington and joined the Bureau of Standards in 1912, where he remained four years. He then spent 14 years in commercial metallurgical laboratories, returning to the bureau in 1930.

♦ ♦ ♦

A. J. Edgar has been appointed works manager, Benton Harbor Malleable Industries, Benton Harbor, Mich. Mr. Edgar, who resigned recently as technical advisor of the Gray Iron Founder's Society, had been associated with that organization since 1942. A graduate of Michigan State College, he entered the service of Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich., in 1932, where he worked in all departments of the foundry. He joined the Steel Sales Corp., Chicago, in 1936, and was engaged in distributing products of the International Nickel Co., as well as acting as foundry engineer in the development of alloy cast iron. Prior to joining Gray Iron Founder's Society he was foundry superintendent, General Railway Signal Co., Rochester, N. Y.

♦ ♦ ♦

Robert C. Wayne, recently released by the Navy as a lieutenant serving at Naval Research Laboratory, Washington, has been appointed assistant to the technical and research director, Steel Founders' Society of America, Cleveland. Mr. Wayne, following graduation from Rensselaer Polytechnic Institute, completed a special course in physical metallurgy at Columbia University. Former connections include, Atha Works, Crucible Steel Co. of America, Harrison, N. J., and Babcock & Wilcox Co., Barberton, O. In recent years Mr. Wayne has been engaged in development of alloy steels, steel castings research, and has written several articles and reports on subjects pertaining to steel castings.

♦ ♦ ♦

Robert H. Owens has been elected vice president in charge of engineering and manufacturing, Roots-Connersville Blower Corp., Connersville, Ind. A graduate of Purdue University, Mr. Owens has been active in engineering and research since 1912. He joined the engineering staff of Roots-Connersville in 1925 and since that time has been responsible for many new centrifugal blower and compressor developments.

♦ ♦ ♦

Edwin M. Allen, since 1934 chairman of the board of directors, Mathieson Alkali Works Inc., New York, has retired from that office but will continue as a director of the company. A graduate of Purdue University, Mr. Allen served his apprenticeship in the shops of the H. K. Porter Locomotive Co., Pittsburgh, and in the drafting rooms of Cambria Steel Co., Johnstown, Pa. Within ten years he became president of the Fayette Mfg. Co. and the Basic Brick Co., and later organized the American Refractories Co., Joliet, Ill. Mr. Allen joined the Mathieson organization as president in 1919, retiring from the office in 1944. During World War II he served on the Chemical Advisory Committees of the Army-Navy Munitions Board and as a member of the advisory board to the Chief of Chemical Warfare Service.

♦ ♦ ♦

Dr. John M. Blocker Jr., physical chemist, has been appointed to the research staff of Battelle Memorial Institute, Columbus, O., and assigned to its division of nonferrous metallurgy. Dr. Blocker received his bachelor of science degree from Baldwin-Wallace College and his degree of doctor of philosophy from Ohio State University. He was formerly a fellow at the latter college and prior to that was associated with the Tennessee Eastman Corp., Oak Ridge, Tenn.

♦ ♦ ♦

R. E. Ward has been appointed chief metallurgical engineer, Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J., succeeding Dr. N. E. Woldman, who has established a consultation service. Mr. Ward is chairman of the Aluminum and Magnesium Division of the American Foundrymen's Association.

♦ ♦ ♦

J. A. Havnen has been appointed technical supervisor of the nonferrous foundry, Flour City Ornamental Iron Co., Minneapolis. Mr. Havnen, recently discharged from military service where he served in an engineering boat and shore unit, formerly was associated with Lynchburg Foundry Co., Lynchburg, Va.

♦ ♦ ♦

Ralph L. Wilcox has been appointed assistant factory manager of the Detroit plant of Gerity-Michigan Die Casting Co. Mr. Wilcox was technical representative in the Chicago office of the New Jersey Zinc Co. for 16 years. During the war he served as zinc consultant to the War Production Board.

♦ ♦ ♦

Robert L. Doelman has resigned from the staff of Harry W. Dietert Co., Detroit, to join his father, M. L. Doelman, who represents Foundry Equipment Co., International Molding Machine Co., Modern Equipment Co., and National Engineering Co. in New York state, northern Pennsylvania and Canada. R. L. Doelman gained experience in the Dietert laboratory in 1940 following a period of practical molding and coremaking apprenticeship in Toronto foundries. For some time he was in charge of the sand department, sand control and research laboratory of

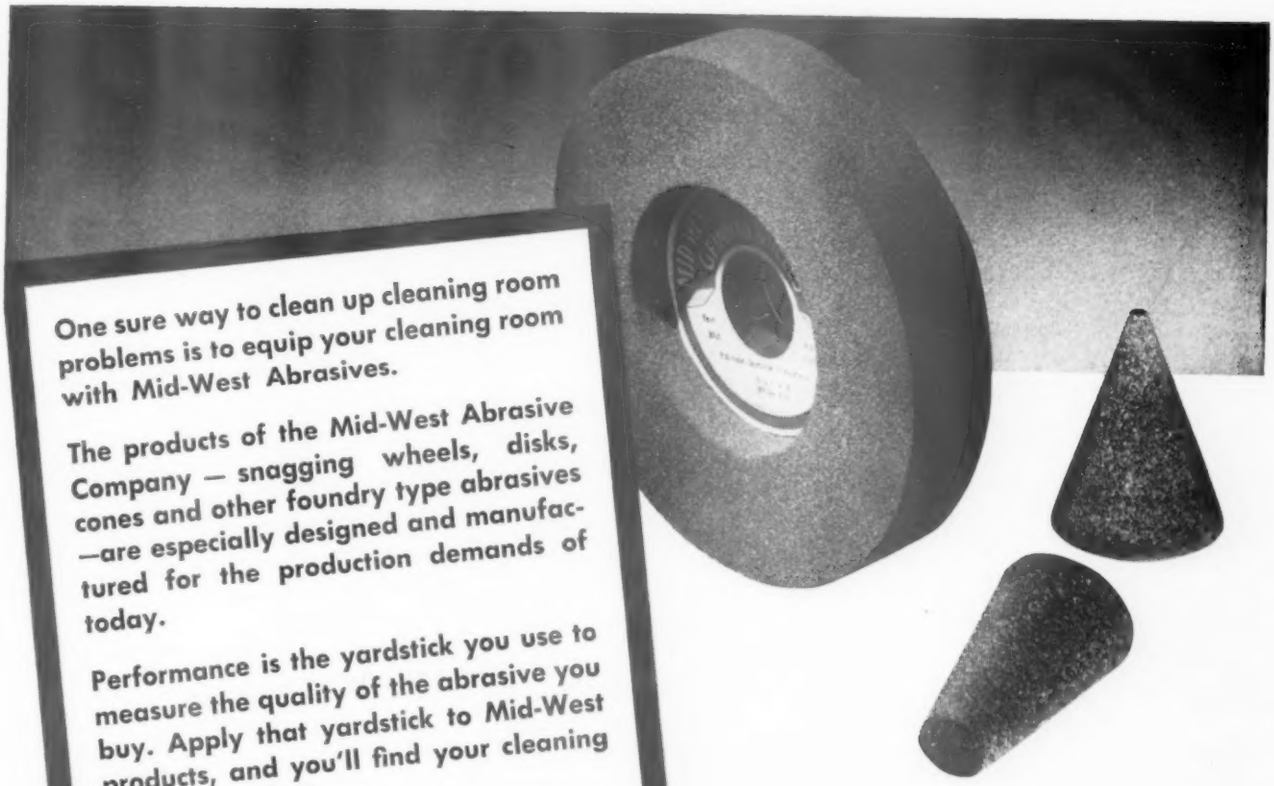
(*Continued on page* 112)

A. J. EDGAR

ROBERT C. WAYNE

ROBERT H. OWENS

EDWIN M. ALLEN



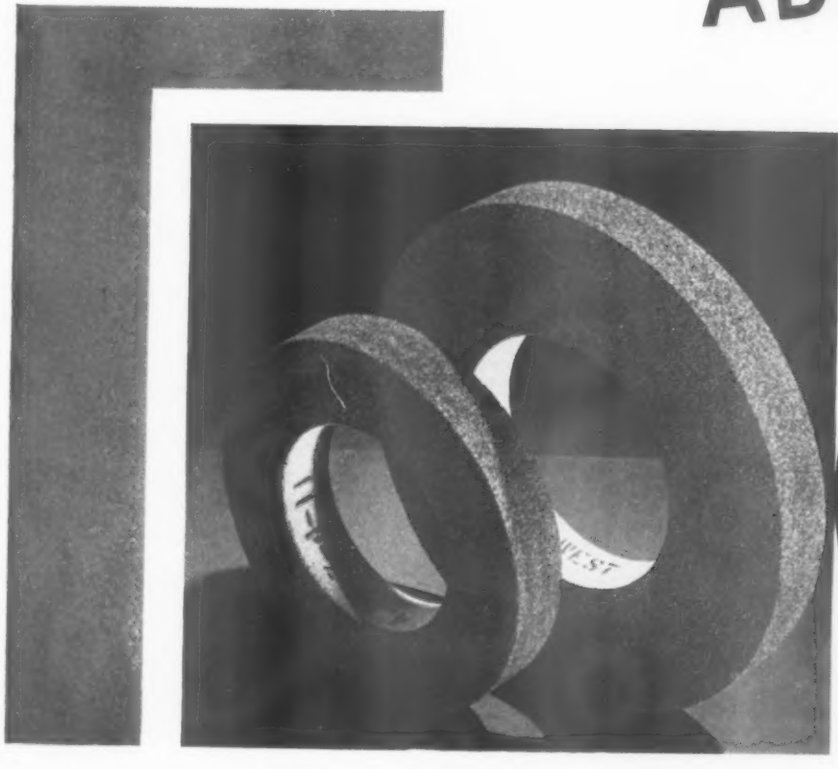
One sure way to clean up cleaning room problems is to equip your cleaning room with Mid-West Abrasives.

The products of the Mid-West Abrasive Company — snagging wheels, disks, cones and other foundry type abrasives —are especially designed and manufactured for the production demands of today.

Performance is the yardstick you use to measure the quality of the abrasive you buy. Apply that yardstick to Mid-West products, and you'll find your cleaning problems solved.

Switch to Mid-West today!

CLEAN UP WITH MID-WEST ABRASIVES



MID-WEST ABRASIVE CO.

Manufacturers of DEPENDABLE Abrasives

OWOSSO, MICH. • DETROIT

ROCHESTER, PA.

(*Continued from page* 110)

Electric Steels Ltd., Three Rivers, Que. In November, 1943 he again joined the Dietert staff in Detroit as sand technician and research worker.

♦ ♦ ♦

R. W. Mason Jr., until recently associated with the Lithium Co., Newark, N. J., has joined the Development and Research Division, International Nickel Co. Inc., New York, with headquarters at the Detroit technical section of the division, where he will serve as metallurgist and consultant on the use of nickel in ferrous and nonferrous castings. Mr. Mason, a graduate of Michigan State College, was an assistant metallurgist, Lakey Foundry & Machine Co., Muskegon, Mich., from 1937 to 1941, when he joined General Foundry & Mfg. Co., Flint, Mich., as assistant to the general manager, for a year. He then spent four years in U. S. Ordnance Department.

♦ ♦ ♦

Charles E. Coulter has been assigned to the Chicago sales territory of the Werner G. Smith Co., Cleveland, as an assistant to J. C. Gore, Chicago manager. Mr. Coulter, a graduate of the University of Southern California in 1943, was released recently by the Navy after three years' service. During that period he served as navigator and executive officer aboard a sub-chaser and later as commander of a destroyer escort. Mr. Coulter is the son of A. S. Coulter, Buffalo sales representative of the Werner G. Smith Co.

♦ ♦ ♦

B. C. O'Brien has been elected president and general manager, Bury Compressor Co., Erie, Pa. Mr. O'Brien is a graduate in mechanical engineering of Rose Polytechnic Institute, and has had wide experience in air compressor manufacture and sales. Prior to joining the Bury company he was associated with Roots-Connersville Blower Corp., Connersville, Ind., where he was vice president and sales manager.

♦ ♦ ♦

Edgar O. Stamm has been appointed sales representative in the Ohio area of Certified Core Oil Division, Socony-Vacuum Oil Co. Inc., Cicero, Ill. Mr. Stamm has been associated with Buckeye Products Co., Cincinnati, since 1933, as vice president and sales manager, and is well known among foundrymen in his new territory.

♦ ♦ ♦

W. G. Ferrell, formerly superintendent of foundries, Auto Specialties Mfg. Co., St. Joseph, Mich., has been appointed general works superintendent in charge of operations of all divisions of the company's main office in St. Joseph.

W. G. FERRELL

♦ ♦ ♦

P. H. Desrosiers has been elected executive vice president and director, Joliette Steel Ltd., Canadian subsidiary of American Brake Shoe Co. which was recently acquired by the latter and is operated by its American Manganese Steel Division in the production of manganese steel and other abrasion resistant alloy castings. Mr. Desrosiers joined Joliette Steel Ltd. in 1916 as secretary-treasurer, later serving as sales manager and managing director until 1932 when he became associated with Sorel Steel Foundries Ltd., Sorel, Que.

♦ ♦ ♦

Elmer Braun, since 1944 superintendent, Saginaw Malleable Iron Division, General Motors Corp., Tilton, Ill., has been made manager of that plant. Mr. Braun has been associated with General Motors more than 16 years. He enrolled in the four-year co-operative engineering course at Flint, Mich., in 1929, and upon completion was made a training instructor at the Saginaw plant, where he became successively inspector, inspection foreman, assistant and chief inspector. When the plant at Tilton, suburb of Danville, Ill., was developed to turn out heavy duty axle castings for military trucks during the war he was transferred there as plant superintendent.

♦ ♦ ♦

John H. Budde Sr., for the last five years production manager, Unit Drop Forge Co., Milwaukee, heads the new Inland Gray Iron Foundry Inc., recently incorporated at Watertown, Wis., for the manufacture of various kinds of castings. Mr. Budde, who will manage the new foundry, formerly was connected with the Liberty Foundry Co., Milwaukee, and Spring City Foundry, Waukesha, Wis.

♦ ♦ ♦

Kenneth H. Barnes has been appointed chief engineer, American Foundry Equipment Co., Mishawaka, Ind. He has been associated with the company for ten years, the first five in the engineering department and the last five years as assistant sales manager. **Chalmer B. Cline,** appointed engineering assistant to the president, recently was released by Army Ordnance Industrial Service with

(*Concluded on page* 114)

R. W. MASON Jr.

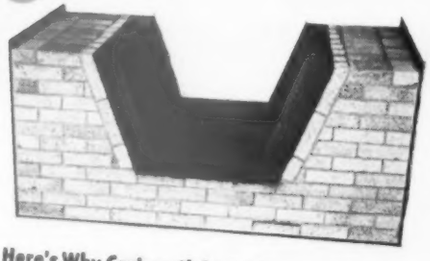
CHARLES E. COULTER

B. C. O'BRIEN

EDGAR O. STAMM

SERVICE RECORDS FOR RUN-OUT TROUGHS

WHEN LINED WITH CARBON!



A LARGE steel company* lined a run-out trough with "National" carbon blocks, to see how this remarkable material would stand up in such violent, destructive service. The company engineers were well satisfied when the carbon lasted for several days. But the carbon lining went right on! It smashed all existing records for run-out trough linings by lasting for weeks and then for months.

And now...incredible though it may seem... this lining is still in good operating condition—after *two years!*

By lining your run-out troughs with "National" carbon slabs, you can get long life and freedom from hazardous maintenance and rebuilding. Also, you get instant cleaning of the trough — a stream of cold water shatters the metal without in any way harming the carbon slabs.

*NAME ON REQUEST

Here's Why Carbon Slabs Perform So Remarkably as a Run-Out Trough Lining:

1 *Carbon has no melting point!* It retains its mechanical strength well past the highest temperatures attained in handling molten metals.

2 *Carbon is not deformed* under the pressures normally encountered at these temperatures.

3 *Carbon is unaffected by changes in temperature*—no matter how rapid or violent—even from 0°F. to 3300°F. in a few minutes.

4 *Molten metal does not stick to carbon.*

GET MORE FACTS!

Engineers of National Carbon Company, Inc., will give you more information on this application for carbon. For other uses of carbon and graphite, ask for Bulletin M-8000 B. Write Dept. FY.

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30 East 42nd Street, New York 17, N. Y.

Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

(*Concluded from page 112*)

the rank of major. His former business connections included Commercial Steel Castings Corp., National Steel & Tube Co., Thew Shovel Co., American Gas Association, and American Mfg. Co. **Sherrill S. Deputy** has been named assistant sales manager. For the past 18 years he had been associated with International Business Machines Inc. in the sales and administrative departments.

♦ ♦ ♦

George A. Lennox has been appointed vice president in charge of sales, Driver-Harris Co., Harrison, N. J., and **Joseph B. Shelby** has been appointed assistant vice president in the same department. Mr. Lennox has been associated with the company since 1907 and is the oldest employee in years of service. He was western district manager from 1916 to 1920 with headquarters in Chicago, returning to the Harrison, N. J., works where he became assistant general sales manager, and general sales manager. Mr. Shelby joined the company in 1919. He handled special sales assignments until 1936 and was appointed foundry manager the year following. Since 1942 he had been assistant general sales manager.

♦ ♦ ♦

Dr. J. G. Thompson has been appointed chief of the Metallurgy Division, National Bureau of Standards, Washington. Dr. Thompson has been chief of the bureau's Chemical Metallurgy Section since 1930 and assistant chief of the division which he now heads since 1942. He was graduated and received his doctor's degree in physical chemistry from Cornell University. He served several years in the former Metallurgical Chemistry Section of the bureau's Division of Chemistry. From 1924 to 1929 he was connected with the Fixed Nitrogen Laboratory of the Department of Agriculture. **William F. Roeser,** chief of the Mechanical Metallurgy Section, has been named assistant chief of the Metallurgy Division. As author or co-author Mr. Roeser has published numerous papers in the bureau's *Journal of Research* and in technical journals, including papers on temperature measurement and materials for pyrometric measurements. He was awarded the John A. Penton medal for a paper presented to the 1928 convention of the American Foundrymen's Association, on "Temperature Measurements of Molten Cast Iron."

♦ ♦ ♦

Arthur H. Allen, who recently was elected chairman of the Detroit Chapter of the AFA, is Detroit editor of THE FOUNDRY and other Penton publications. A metallurgical engineering graduate of Case School of Applied Science, Cleveland, Mr. Allen joined the Penton Publishing Co. in 1928 and was in the Cleveland headquarters until his appointment to the Detroit office in 1937. He served the Detroit Chapter as secretary for several years and as vice chairman in 1945-46.

♦ ♦ ♦

Walter C. Kerrigan has been appointed manager of the nickel sales department, International Nickel Co. Inc., New York, succeeding **Rudolph L. Suhl,** who died recently after 43 years with the company. Mr. Kerrigan has been engaged in the metal and ore industries since 1919. He joined International Nickel in 1930 and has been an assistant manager of the nickel sales department since 1933.

♦ ♦ ♦

Abrasive division, Norton Co., Worcester, Mass., has announced a number of changes and appointments in its Connecticut area. **R. W. Price** has been appointed district manager. **C. B. Price, Jr.,** recently released by the Navy, has been appointed abrasive engineer, taking over R. W. Price's former territory in the northern half of the state. **J. L. Tobey** will continue as abrasive engineer in southern Connecticut. **O. A. Nierendorf,** representative for many years, has been extended an indefinite leave of absence because of ill health.

♦ ♦ ♦

Walter C. Foote has been appointed Norbide engineer by the Norton Co., Worcester, Mass., for the states of Michigan and Ohio, succeeding **F. C. Knowles,** who has resigned because of poor health. Mr. Foote will handle engineering work on all types of Norton boron carbide products, including gages and pressure blast nozzles.

♦ ♦ ♦

Emil H. Lang has been elected president, Erie Forge Co., and Erie Forge & Steel Co., Erie, Pa., succeeding the late **Robert F. Devine Jr.** The following were also elected officers of both companies: **G. W. J. Stout,** vice president; **Craig Devine,** treasurer; and **F. E. Wuenschel,** secretary.

♦ ♦ ♦

Leslie C. Smith, for the last three years Chicago district manager Peninsular Grinding Wheel Co., has become associated with Harry W. Leighton Co., Milwaukee, and will represent the company in the state of Wisconsin. Mr. Smith was secretary of the Chicago Chapter, of the AFA the last two years.

♦ ♦ ♦

Frank Donick has left Castalloy Co., Cambridge, Mass., where he was chief engineer and metallurgist, and has started his own foundry under the name of Dexter Alloys, 24 Dexter St., Everett, Mass. The foundry will cast aluminum, bronze and magnesium alloys.

♦ ♦ ♦

John L. Furey Jr. has been appointed sales and service representative of Swan-Finch Oil Corp., New York, in the Philadelphia territory. Mr. Furey has been associated with the industrial trade for the last 16 years.

JOSEPH B. SHELBY

GEORGE A. LENNOX

Dr. J. G. THOMPSON

ARTHUR H. ALLEN

"I framed that x-ray picture because *it saved me* $65,000"

. . . Radiography eliminated internally unsound castings . . . saved $50,000 in machining . . . showed foundry how to salvage $15,000 worth of rejected castings.

You might want to frame some of *your* x-ray pictures if you dug out all the facts and figures.

When you balance the relatively small cost of radiography against the actual sums realized through increased production and lowered costs, you see in black and white that . . .

. . . Radiography, applied at the right time and place, can mean the difference between getting into sound production fast and fighting delay . . . between an acceptable job and customer rejections . . . between a fair profit and heavy losses.

Your local x-ray dealer will be glad to discuss the economic side of radiography with you . . . will suggest additional ways to make radiography pay . . . in better design . . . lighter weight products . . . higher quality . . . more sales appeal. Or write to

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Rochester 4, New York

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Kodak

Around DETROIT

By A. H. ALLEN
Detroit Editor, The Foundry

Poorer outlook for raw material supplies contributes to downward revisions in probable output of cars and trucks over next 12 months . . . Pig iron still sore spot

AUTOMOBILE industry planners and scheduling experts are taking some careful squints at the materials outlook over the next year and what they see disturbs them no little. Already there has been a sharp downward revision in production forecasts, and where not so long ago there was enthusiastic talk about 7,500,000 cars and trucks annually, the most optimistic now believe that 5,000,000 passenger cars and 1,000,000 trucks is just about the ceiling under the most favorable circumstances, because of limitations on the availability of materials.

Of course there is the further disconcerting factor that car buyers who were supposed to be lined up 15 millions deep behind dealers' showrooms are becoming a little choosy and many are deciding to postpone purchases for awhile, feeling that 1946 models may suffer quality-wise due to lack of essential materials. There is also plenty of order duplication for new models, many buyers having placed orders with as many as a dozen different dealers, planning to take the first car that comes their way and cancel the other orders. When all this water is washed out of the market, as it shortly will be, car builders will find their backlogs far below the rosy levels talked of a year ago. There is some support for the belief actual passenger car buying potential may not run much over 5,000,000 units.

Pig Iron Running Short

Even with the deflated production outlook, there is serious concern over the materials supply picture. For the past month, a critical shortage of pig iron has been the principal worry, since it affects foundry operations so importantly. The situation is the outgrowth of a number of related factors. First, of course, pig iron producers received a major setback in the steel, coal and railroad strikes from which they have never fully recovered. Secondly, during the rail strike, many steel plants used up disproportionate amounts of their scrap inventories because of inability to get delivery of pig iron, after which scrap piles were badly depleted, necessitating a sharp increase in the proportion of pig iron going into open-hearth charges. Right now some open hearth operators are talking about stepping up to 80 per cent pig and 20 per cent scrap, simply because it is becoming virtually impossible to buy any appreciable amounts of scrap on the outside. A third factor has been the diversion of pig iron by the CPA to melters outside the automotive industry—soil pipe manufacturers, for example—in the interests of speeding the housing program.

Situation Not Too Serious

Viewed from the overall standpoint, such diversion of tonnage does not appear too serious, but when an automotive foundry has been dependent upon one source for pig iron and finds this supplier's output peremptorily shuttled to another direction, trouble is bound to result. A case in point is Packard which had been receiving four cars of pig iron per week from its regular source, permitting operation of the gray iron foundry at about 25 per cent of capacity. Almost without warning, all this iron was diverted away from Packard and only by dint of some high-pressure tactics was it possible to obtain a car of iron from another source. However, inventories were exhausted and 50 tons of iron a week was a far cry from the 200 tons formerly being shipped into the plant. Loud protests were forthcoming from the Packard management and some relief was obtained, but the situation generally remains precarious.

Expedients are being studied for cutting down pig iron in cupola charges. One involves the use of steel scrap along with slowing down melting time. Important savings in pig iron can be realized but production per hour is reduced appreciably. Meanwhile some of the automotive industry buyers have launched a concerted probe trying to find out just why the pig iron shortage should be so critical and what may be expected in the way of relief. Little of a definite nature can be determined. For one thing, no one seems to know the extent of the present or proposed diversion of pig iron by the government to other industries. On top of this pig iron suppliers say the situation should improve in a matter of weeks, but they may be just whistling in the dark. It is indeed a strange anomaly that with both capacity and production of pig iron at virtually all-time high levels, a shortage persists. The facts just do not make sense.

One wonders how much worse the industry's supply position might now be if it had been able to realize the production goals originally set up for this year. Thus, manufacturers at one time were figuring on building 3,343,000 cars and trucks in the first six months of the year, while actual assemblies amounted to only about 1,000,000, or 27 per cent of expectations—and still there is not enough pig iron for automotive foundries!

Produce 2,600,000 Vehicles

The realistic viewpoint of the last half of the year now calls for output of about 2,600,000 vehicles. To see what this means in terms of castings, apply the total to the average weight of gray iron and malleable iron per car in latest estimates of the CPA, figuring a total of 2,000,000 passenger cars and 600,000 trucks, these averages being 614 pounds of gray iron and 76 pounds of malleable per passenger car, and about the same gray iron and somewhat more malleable for trucks. Result is an indicated need for around 800,000 tons of gray iron and 130,000 tons of malleable over the next six months. These are gross tonnages, including the weight of metal lost in fabricating operations. The indicated total gray iron tonnage is somewhat less than a single month's shipments of all types of gray iron castings at current production levels.

* * *

ENGINEERS high in the ranks of the Ford hierarchy are reportedly doing some long-range thinking on automobile design and assembly which has interesting foundry connotations. They would like to see it possible—and as yet it is only a dream—to buy cast parts

(*Concluded on page* 118)

There IS a Great Difference in ROLLER CONVEYER

WHEN you buy Roller Conveyer, keep in mind the service that you should expect from it. While two sections of different manufacture may appear to be of identical design, actually there is probably a vast difference in them. The gauge and quality of tubing used — the design of the bearings and the method of their lubrication. The size and style of axles, and the method of securing them in the frames. The construction and crossbracing of the frames. The couplings and supports. The weight and strength of the section. These are points which should be considered important. They quickly show that there is a difference in Roller Conveyer.

There is 40 years' experience behind Mathews Roller Conveyer. It is engineered to give long, efficient service, and each section is designed to meet specific customer requirements. We will gladly mail you complete data without obligation.

Mathews Conveyer Company
Ellwood City, Pennsylvania

(*Concluded from page 116*)

produced to such fine tolerances and with such precision finish that comparatively little or no machining would be involved prior to their assembly. This applies particularly to engine parts and suggests that a change from iron to aluminum may be in the cards some day. It might even presage the eventual elimination of the conventional automotive gray iron foundry.

Most automotive process engineers are working in the direction of eliminating machining operations because they are costly and time-consuming. If a part can be produced originally, by any of the conventional methods—forging, casting, die casting, welding etc.—so that it requires no further chewing away of metal, important economies are bound to result. However, there is little cause for concern over any possible radical change in this direction in the immediate future, but at least it is of moment to realize the direction in which engineering thinking is pointed.

* * *

TWO special types of heat treatment on pearlitic malleable iron castings are being carried out in automotive plants in this area. Buick is case hardening pearlitic malleable in lead pots, and Packard is differential hardening the material by the electric induction process.

* * *

C. J. FREUND, well known in foundry circles throughout Michigan, dean of engineering at the University of Detroit, has had three new honors conferred upon him in recent weeks. He has been elected president of the Engineering Society of Detroit, in whose affairs he has participated prominently for many years; in St. Louis recently he was named vice president of the American Society for Engineering Education, and he has been elected treasurer of the Engineering College Research Association.

FOUNDRY SUPPLY GROUP

Reorganizes, Elects Officers

F. RAY FLEIG

E. H. KING

FOLLOWING, with considerable regret, the resignation of Charles R. Stevenson of Stevenson, Harrison & Jordan, New York, as directing head of the 20-year old Foundry Supply Manufacturers Association, this organization reorganized at a recent industry meeting. Officers elected at the meeting include: President, F. Ray Fleig, president, Smith Facing & Supply Co., Cleveland; vice president, E. H. King, vice president and general manager, Hill & Griffiths Company, Cincinnati; executive director and treasurer, Arthur J. Tuscany, Arthur J. Tuscany Organization, Cleveland.

All of the officers have been actively identified for many years with various organized activities conducted on behalf of the foundry industry. Mr. Fleig is a graduate of the University of Illinois and has been connected with Smith Facing Supply Co., manufacturer of foundry facings, for 33 years in various executive capacities. For over ten years he has served as president of his company. In addition to his work on behalf of manufacturers of foundry supplies, he has served as director and chairman of the Northeastern Ohio Chapter of the American Foundrymen's Association and at present is chapter treasurer.

During his college days Mr. King became interested in foundry work, conducting research in sand problems. Prior to joining Hill & Griffith he was sales manager for Hougland & Hardy, Evansville, Ind. After several years as sales manager for Hill & Griffith he was appointed vice president and general manager of the company in January, 1944. Mr. King has served on both national and local chapter committees of the AFA, and was chairman of the Cincinnati Chapter 1943-1944.

Mr. Tuscany's contact with the foundry industry dates back about 25 years, starting as executive secretary of Ohio Foundrymen's Association. He was instrumental in organizing the Gray Iron Institute and conducted the programs of that organization and its successor, Gray Iron Founders' Society for seven years. Since 1935 he has been head of the Arthur J. Tuscany Organization, specializing in trade and economic counsel work.

Effective July 1 the new headquarters of the Foundry Supply Manufacturers Association were established in the Engineers Building, Cleveland 14.

Committees already designated by the association are: Executive committee, consisting of the officers; traffic committee, consisting of L. H. Heyl, Federal Foundry Supply Co., Cleveland, E. H. King, Hill & Griffith Co., Cincinnati, Frank B. Flynn, S. Obermayer Co., Chicago.

The association, under its new plan of operation, is giving careful thought to conducting a research program and a plan for transmitting to foundries pertinent information regarding the best use of foundry supplies.

Book Review

How To Evaluate Supervisory Jobs, edited by Albert N. Gillett, 141 pages, published by National Foremen's Institute Inc., Deep River, Conn. Price $7.50.

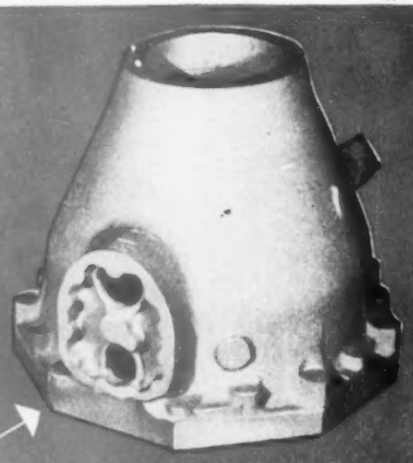
The author seeks to avoid the costly mistakes of administration common to the usual trial-and-error method in the selection and payment of surpervisory personnel. He provides definite, detailed methods for evaluating the job and appraising the job holder.

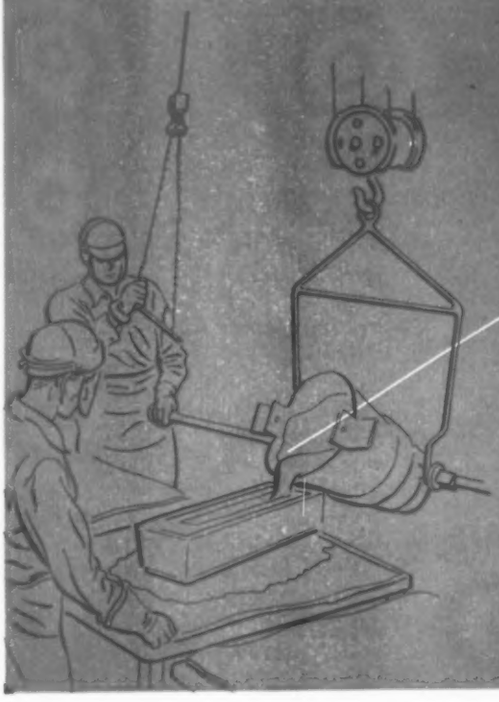
The manual has three sections. Part I explains and describes the job-analysis-rating-evaluation of supervision method, which enables management to determine how much the job itself is worth in either hourly rate or salary range. Part II is devoted to a detailed description of a definite plan by which management can determine the weak and strong points of the individual occupying the supervisory position. Part III supplies the reader with kit of blank forms for running his own tests, 22 forms in all, printed on heavy ledger paper, designed for actual use, applicable to both plant and office personnel.

in modern foundries everywhere

they're casting lightness

and strength





For lightness . . . and soundness and strength . . . they're casting magnesium today. It's a standard material for many modern castings, ranging from tiny fittings a few ounces in weight right up to big pump bases weighing hundreds of pounds.

Progressive foundrymen have come to recognize the good casting characteristics of magnesium alloys. Manufacturers know magnesium castings improve products because they weigh less. And there is no structural metal to equal the strength-weight ratio of magnesium.

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Ready . . . to make products move!

MAGNESIUM

LIGHTEST OF ALL STRUCTURAL METALS

Dow produces casting alloys to meet a variety of property requirements, also a complete line of fluxes and accessory materials.

Continuous magnesium research and development work enable Dow to offer foundries full engineering assistance on all related technical problems.

Procedures and facilities for working magnesium, such as sand casting clean-up, are readily available in many modern plants.

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MAN-TO-MAN on the Molder's Bench

"We Get Along Better Than I"

By RALPH L. LEE

THIS is the last straw, I've taken all I'm going to, you're through." Almost any experienced foundry boss will agree you cannot run a job for long without some kind of discipline, but maintaining discipline in this day and age is one of the meanest and toughest problems he has to face.

We all know that in days gone by the old bull-of-the-woods solved this problem in short order. He did it on the basis of DO WHAT I SAY OR ELSE with no back talk and with his firing club always in hand. He was king of the shebang, court of last appeals and hired and fired as he alone saw fit. He took hard work from his men for granted as his just due, and loafing, laziness, mistakes, scrap and horseplay as downright personal insults. What little conversation he did have with those who worked for him was absolutely devoid of the word "we". Every other word was "I". He was an "I" man in every sense of the word.

While a lot of water has gone over the dam since the bull-of-the-woods had his fling, I find among my many boss acquaintances some who still throw their weight around as much as they can get by with and who are still trying to maintain discipline on the "I" basis.

According to my experience, there is no surer test of the caliber of a boss than the number of "I's" he uses in relation to the "we's" when talking to his people. "I want twelve from this pattern and six from this. I want them tonight without fail. I want you to step on it and get those cores in the oven. I want you to stay on the job and quit running all over hell and back. I want you to keep this aisle clear; how many times do I have to tell you? I have taken all I'm goin' to take from you, this is the last straw."

To my way of thinking, the "I" habit is positive proof that the boss

who has acquired it has the wrong idea as to what his job really is and as to the position he holds. In the back of his mind he must still feel himself to be on the bench turning out molds with helpers His constant use of the word "I" indicates that he is laboring under the impression that it is he who is doing the departmental job and that all his employees are only helpers. Something like an orchestra leader who has kidded himself into thinking that he is producing the music instead of helping his musicians keep together by waving a perfectly silent maple stick.

On the other hand, a boss who is fully aware of the fact that it is not *he* but his people who are turning out the work and that his job is to help them do it, could not possibly get into the habit of using "I" every other word. Instead of "I" this and "I" that, he would instinctively say, "Sam, we'll need twelve from this pattern and six from this one. And Sam we've got to have them tonight.

"Bill, those cores should be in the oven now so we won't get caught short, so what do you say we step on it a bit.

"George, we are never going to meet our schedule with you running all over hell and back, what do you say that we snap into it.

"Fred, somebody is going to get hurt just as sure as shootin' if we don't keep this aisle clear.

"Mike, this is three times in a row and once before last month. Each time I've tried to sell you on not doing it again and what would happen if you kept it up. I can't figure out whether you just can't stop or won't, but the fact is that you haven't. In justice to the rest of the boys and in fairness to the job, you know there is only one thing left to do and that's to call it quits. I'm sorry Mike, but that's the way it is."

It seems that we can't approach the correction of others with the attitude that they have misbehaved to spite us personally, any more than we can approach a cupola as though it froze up out of spite. The same selfless open-minded and fact-finding approach must be used in either case. The ability to subtract self from human relations problems is unquestionably the key to successful leadership and the good discipline which invariably follows. While none of us has wholly mastered this art, the more we do the better bosses we are bound to be and the less likelihood of anyone catching us saying or thinking, "This is the last straw, I have taken all I'm goin' to take."

OBITUARY

HARRY C. DONALDSON, 69, partner in the firm of Brumley & Donaldson, Los Angeles and San Francisco, died May 19. Mr. Donaldson had been identified with the foundry industry since 1922 when he went to the West coast to become sales manager of Spreckles Bros. Commercial Co. In 1924 the company sold its interests and Mr. Donaldson founded the H. C. Donaldson Co., which later became Brumley & Donaldson Co., well known in the foundry equipment and raw material industries both in northern and southern California.

° ° °

Wesley Lambert, C.B.E., one of the best known metallurgists in the foundry world died recently at his home in Westgate-on-sea, England, where he had been living in retirement for the past 10 years. He received his early training at Roan School, Greenwich, and his technical training at King's College where he received the Jelf Medal and Cunningham Prize. In 1890 he was appointed assistant metallurgist at the Royal Gun Factory,

(*Continued on page* 122)

Crown Hill

Means Quality Seacoal

quick flash

high quality

low sulphur

quick venting

trifling ash

low cleaning cost

CROWN HILL SEACOAL FACING enjoys a reputation built on quality, uniformity and consistency. Castings peel easily due to the fact that the small ash residue left is 2980 degrees F. and molten iron can't fuse it. Low sulphur content eliminates hard spots and the high-volatile, quick flash coal from which it is made vents the mold perfectly. Repeat orders prove its worth.

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IN TWIN CITIES: The Foundry Supply Co., Inc., 2295 University Ave., St. Paul 4, Minn. IN SOUTHWEST: Beaumont Cement Sales Co., Houston & Beaumont, Texas, and Harvey, La.

(*Continued from page* 120)

Woolwich. In 1894 he was employed by the Ottoman government as metallurgist lecturer in engineering and chemistry. Returning to London he was appointed chief metallurgist at the Royal Gun Factory. In 1912 he became metallurgical manager for J. Stone & Co., Deptford, and traveled extensively in the United States, South America, Russia, Scandinavia and South Africa. He was a prominent member of the Institute of British Foundrymen and served as president in 1929.

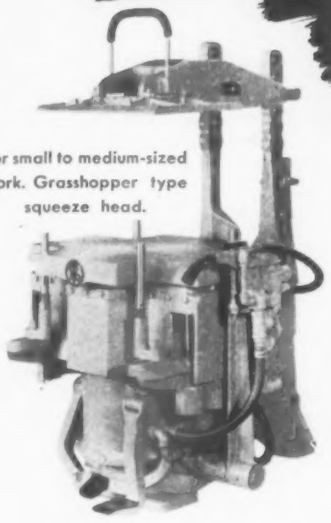
• • •

Rudolph L. Suhl, 64, manager of the nickel sales department, International

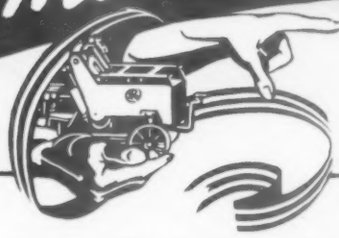
(*Concluded on page* 124)

A few of the thousands of visitors and participants at the AFA Foundry Show in Cleveland. These are largely Wisconsinites; the photos are by courtesy of John Bing, A. P. Green Fire Brick Co., Milwaukee

SPO No. 200 SERIES *Molding Machines*



For small to medium-sized work. Grasshopper type squeeze head.



For medium to semi-heavy work. Complete shielding against sand.

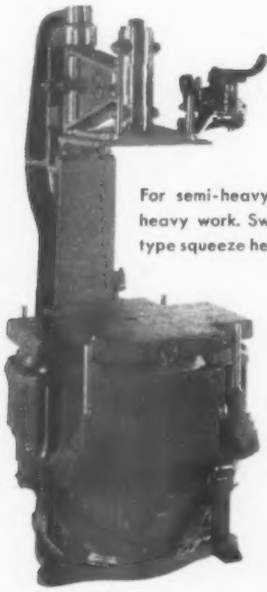
1-2-3, JUST LIKE THAT!
—AND ALMOST AS QUICK

(1) Jolt; (2) squeeze on the *up-stroke;* (3) draw on the *down-stroke* ready to remove mold. *Could any set of operations be simpler?*

In other words: place flask over pattern, fill with sand and jolt, press lever to squeeze and strip mold automatically, remove finished half mold. Drawing pattern costs *no time whatever.*

Perfect draw at breakaway and throughout operation, thanks to SPO's patented self-aligning stripping mechanism. Rugged and compact; adjustable to cover wide range of work; very few working parts keep maintenance next to nil.

SPO No. 200's are well known for the fast production of good molds. "Such popularity must be deserved."



For semi-heavy to heavy work. Swing type squeeze head.

For heavy work. Note clean understructure.

Write for bulletin giving range and capacities of these machines.

MEMBER

SPO INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND, OHIO

(*Concluded from page 122*)

Nickel Co., New York, died June 10, at his home in Plainfield, N. J. After attending Pratt Institute, Polytechnic Institute of Brooklyn and Columbia University, Mr. Suhl joined the Oxford Works, International Nickel Co., Bayonne, N. J., in 1903, serving in the chemical laboratory and later became superintendent of the calcining department. When the Development and Research Division was formed in New York, in 1922, Mr. Suhl was one of the original staff. He became assistant manager of the nickel sales department in 1929 and manager in 1932.

° ° °

Leonard E. Schad, 79, prominently connected practically all his adult life with foundries in Portland, Oreg., died there recently. He was born in Portland, attended school there and served an apprenticeship at the molding trade. Following a young journeyman trip East and a period in a Detroit steel foundry, he returned to Portland and founded the Portland Bronze & Crucible Steel Foundry. Later he established the Electric Steel Foundry. In succeeding periods he was superintendent for the Vaughan Motor Co., the Northwest Stove Works and the Hesse-Ersted Iron Works. His last active connection was with the Montag Stove Works, from which he retired after V-J day. In collaboration with Albert E. Greene over many years he developed numerous improvements in electric furnace design and practice.

° ° °

William H. Walleck, 63, founder and president of Walleck Brass Foundry, Cleveland, for over 25 years, died June 29, at his home in that city. Mr. Walleck, a native of Austria-Hungary, went to Cleveland at an early age. Following a foundry apprenticeship he started his own company. Because of ill health he retired from active business in 1941.

Etienne M. Roubieu, 63, for the last 20 years chief engineer and vice president in charge of the Brazilian office of Tropenas Co., New York, died May 13, in Rio de Janeiro. Mr. Roubieu, a native of France, came to the United States in 1905, and has been associated with Tropenas Co. since 1908. He was an authority on side-blow converter practice and a well known metallurgist.

° ° °

William A. Pfister, 72, who in 1910 founded the Price-Pfister Brass Mfg. Co., Los Angeles, died June 30. He retired from active business in 1941.

° ° °

Harry N. Curd, 61, vice president and general manager, Pacific Car & Foundry Co., Seattle, died June 14, in that city.

° ° °

Edward W. Clarke, 73, a former general superintendent, Eastern Malleable Iron Co., Wilmington, Del., died June 13, in the Delaware Hospital, that city.

Additional views of Wisconsin foundrymen at the Foundry Show. (Photos by John Bing)

You Get Quick Collapsible Cores With

KRAUSE Truscor AND Amerikor

(LIGHT WEIGHT) CEREAL BINDERS (HEAVY WEIGHT)

A small percentage added to your mix will:

- Supply proper green bond to sharp sand
- Give smooth performance in core boxes
- Reduce core and cleaning costs
- Bring out fine detail

SHOWN above is an unretouched photograph of a number of malleable cores made with Krause Cereal Binder where collapsibility is important. Notice the accurate detail . . . the smoothness of surface . . . the sharp, unbroken edges. Figure it out for yourself what it would mean in your foundry to have such cores . . . to have them easier . . . at lower cost . . . with fewer rejects. Truscor and Amerikor are made to the most exacting standards. The result is a combination of unvarying quality, greater binding strength in the green and dry core stages, increased permeability, less sticking, easier ramming—and increased production of better cores. On your next order for cereal binder, specify Truscor or Amerikor. Phone, wire or write outlining your core problem in detail.

CHAS. A. KRAUSE MILLING CO., Milwaukee 1, Wis. · *World's Largest Millers of Dry Corn*

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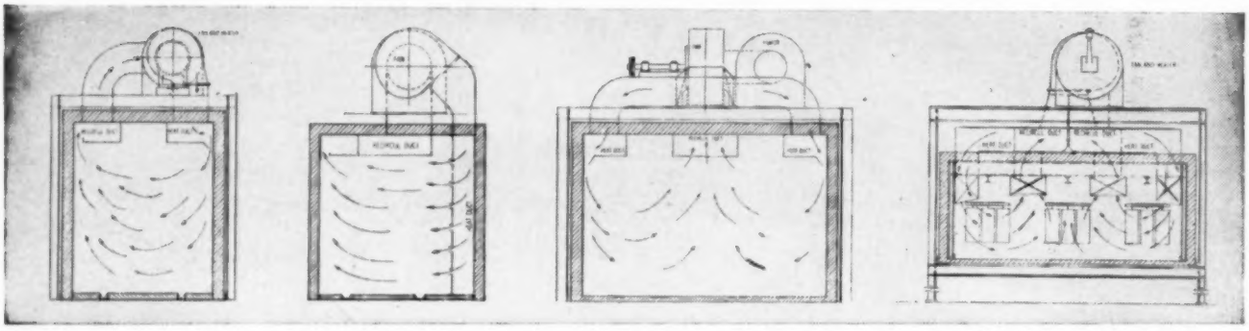
HOW TO PRODUCE BETTER CORES

Examples of Successful Gehnrich Recirculating Convection Heating Systems that Assure Uniform, Thorough Baking Most Efficiently — In Minimum Time

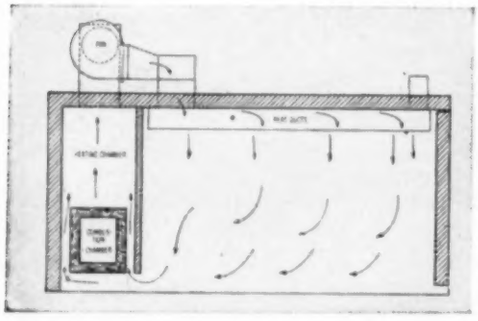


Cross Flow Circulation with heated air blown from a heat duct uniformly across a truck, rack or car of cores or molds, and recaptured via a recirculation duct at the opposite side of oven into the heater on the roof.

Cross Flow Circulation with heated air blown through louvres, in a heat duct extending full oven height, horizontally across trays, shelves or drawers of work, even on close centers, and recirculated to heater.

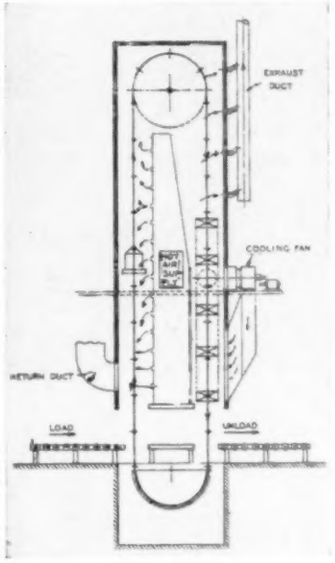
Double Down Flow Recirculation with heated air blown through ducts at both sides of oven and recirculated through a duct in the middle of the roof; recommended for batch loads in wide ovens or for work moving in tunnel ovens.

Double Down Flow Recirculation with heated air blown from sides of oven and recirculated through ducts in roof; recommended for work on racks moving on conveyors making several counterflow passes through oven; can be zoned for any desired processing conditions.



Integral Recirculating Convection with heater section built inside oven housing but separated from baking chamber by insulated wall; heated air blown through top ducts at oven sides, and recirculated back into heater section. A very efficient, space saving oven for work loaded in large or heavy masses on cars, trucks or racks.

Cross Flow Circulation in Tower Ovens with heated air from external air heater or internal burners distributed horizontally, through a louvred duct, across the cores on carriers suspended from a conveyor moving through the evaporation, oxidation and cooling zones.



There are other variations of these Gehnrich recirculation systems to produce conditions that provide complete baking uniformity, strengthening of cores, saving fuel and time. Each Gehnrich core oven is an engineered job, "tailor-made" to meet specific production conditions. It *must* be "right". Hundreds of satisfied foundrymen will tell you that, and Catalog No. 113 tells why. Write for a copy.

GEHNRICH OVEN DIVISION

W. S. ROCKWELL COMPANY

210 ELIOT STREET • FAIRFIELD, CONN.

PREPARING TENSION TEST SPECIMENS FOR COPPER-BASE ALLOY CASTINGS

ASTM DESIGNATION: B—46T

SCOPE

1. This recommended practice outlines the procedure for preparing test coupons and specimens (machined and unmachined) for tension tests of copper-base alloy castings.

TEST COUPONS

2. (a) LOW-SHRINKAGE ALLOYS.—It is recommended that the test specimen coupons for copper-base casting alloys exhibiting low shrinkage during freezing and cooling be cast to the form and dimensions shown in Fig. 1, and they shall not be chilled. The fin gate along the side shall be 5/16-in. in thickness at any point along its length.

(b) HIGH-SHRINKAGE ALLOYS.—It is recommended that the test specimen coupons for copper-base casting alloys exhibiting high shrinkage during freezing and cooling be cast to the form and dimensions shown in Fig. 2, and they shall not be chilled. If specimens having threaded ends are to be used in the tension tests, the length of the blocks may be reduced to 6¼ in.

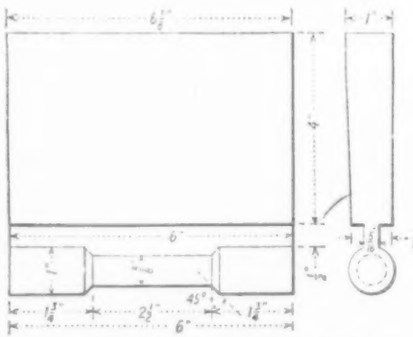


FIG. 1.—Test Specimen Coupon for Low-Shrinkage Alloys.

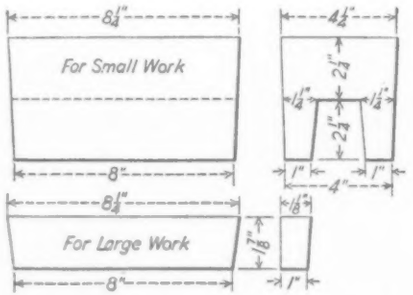


FIG. 2.—Test Specimen Coupon for High-Shrinkage Alloys.

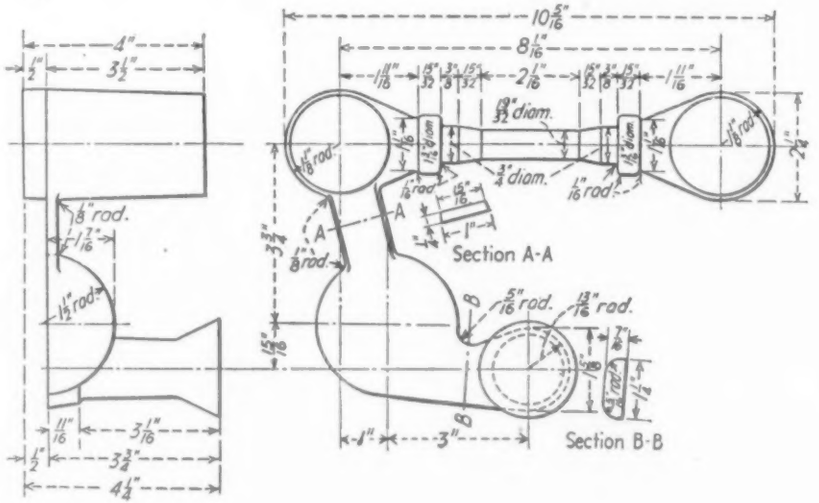
(c) TEST COUPONS CAST TO SIZE.—When agreed upon between the manufacturer and the purchaser test specimen coupons may be cast to the form and dimensions shown in Figs. 3 or 4, which represent cast-to-size button-head or friction-grip tension test specimens.

TEST SPECIMENS

3. (a) Tension test specimens shall be machined from the coupons described in Sections 2 (a) and (b) and shown in Figs. 1 and 2. They shall be of the form and dimensions shown in Fig. 5.

(b) In the case of test specimens prepared from the coupons shown in Figs. 3 or 4, the manufacturer shall have the option of testing the specimens without machining the gage length, or the coupons may be machined to the dimensions shown in Fig. 5.

This Tentative Recommended Practice has been approved by Committee B-5 on Copper and Copper Alloys, Cast and Wrought of the American Society for Testing Materials, and accepted by the society in accordance with established procedures, for use pending adoption as standard. Suggestions for revisions should be addressed to the society at 1916 Race street, Philadelphia 3.



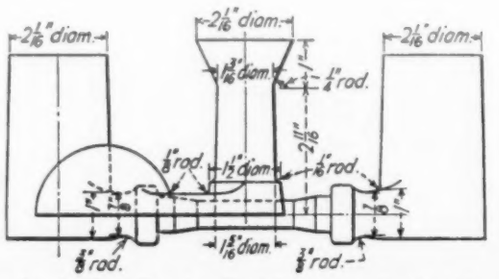


FIG. 3.—Optional Coupon for As-Cast Tension Test Specimen, Button Head.

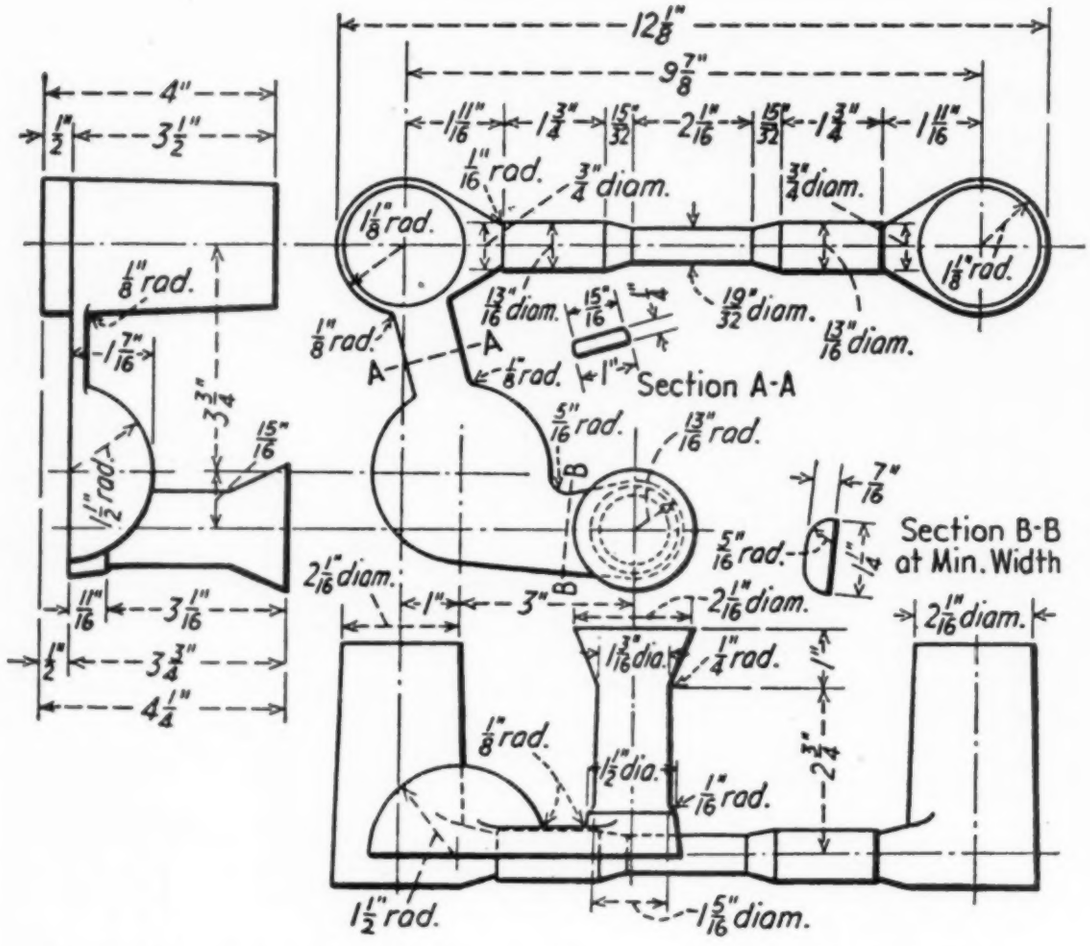
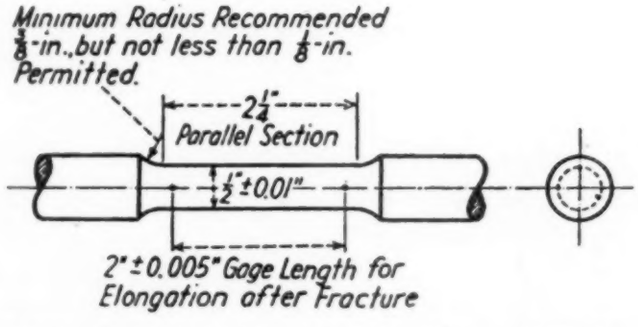


FIG. 4.—Optional Coupon for As-Cast Tension Test Specimen, Friction Grips.


Minimum Radius Recommended 3/8-in., but not less than 1/8-in. Permitted.
2 1/4"
Parallel Section
1/2" ± 0.01"
2" ± 0.005" Gage Length for Elongation after Fracture

NOTE:—The gage length, parallel section, and fillets shall be as shown, but the ends may be of any shape to fit the holders of the testing machine in such a way that the load shall be axial.

FIG. 5.—Standard 2-in. Gage Length Tension Test Specimen.

Sly Dust Filter mounted over Sly Blast Room

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THE Sly Dust Filter (shown at left) handles the dust created by a Sly Blast Room, grinder booths, and surface grinders.

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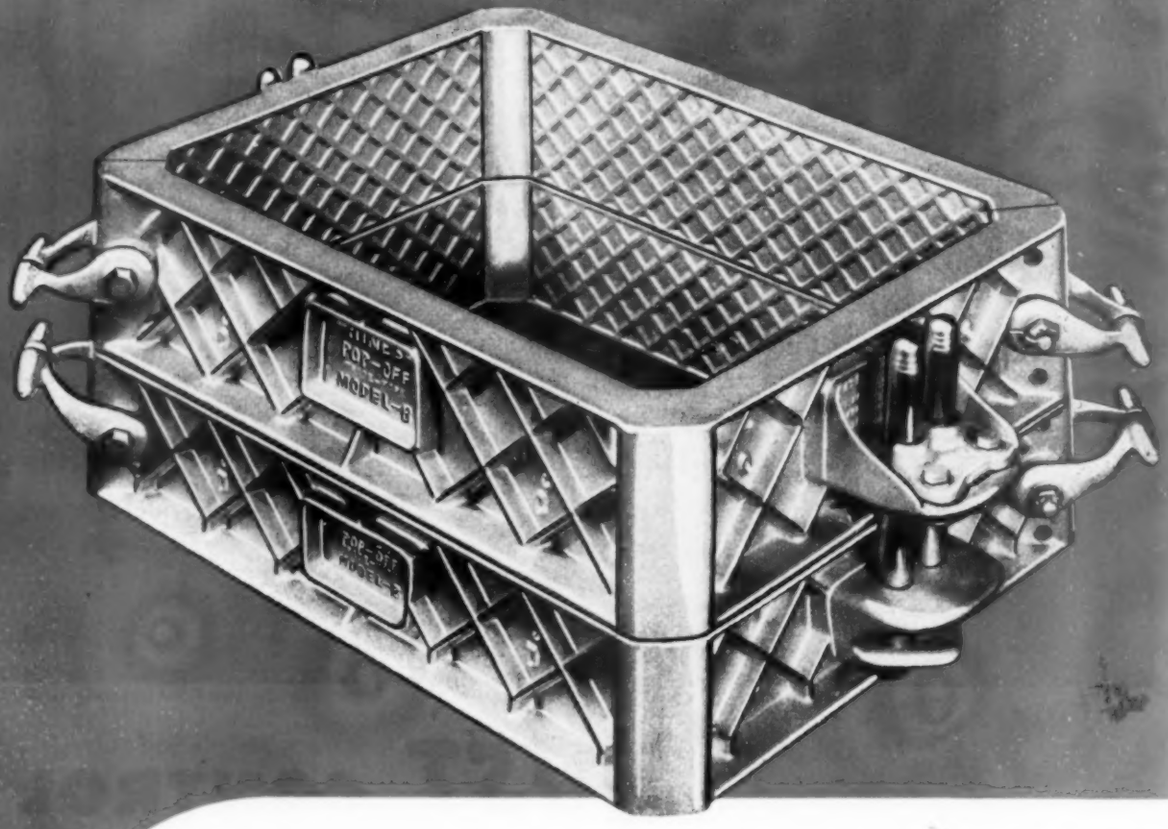
ALUMINUM POP-OFF FLASK

for high production on light squeezers



HINES
POP-OFF
(Trademark Reg. U. S. Pat. Off.)
FLASK

The LIGHTER WEIGHT

This illustration of the Hines Model "B" Aluminum Pop-Off Flask is a good picture of a good product—but many of its important points can't be *seen.* Some of these points are LIGHT WEIGHT, EXTREME DURABILITY, LOW PRICE, UTILITY and the fact that it will ELIMINATE SHIFTS. Hines Flasks are designed to "make the tough jobs easy"; they set a pattern for economical foundry operation.

FOR BEST RESULTS, USE HINES JACKETS . . .

THE HINES

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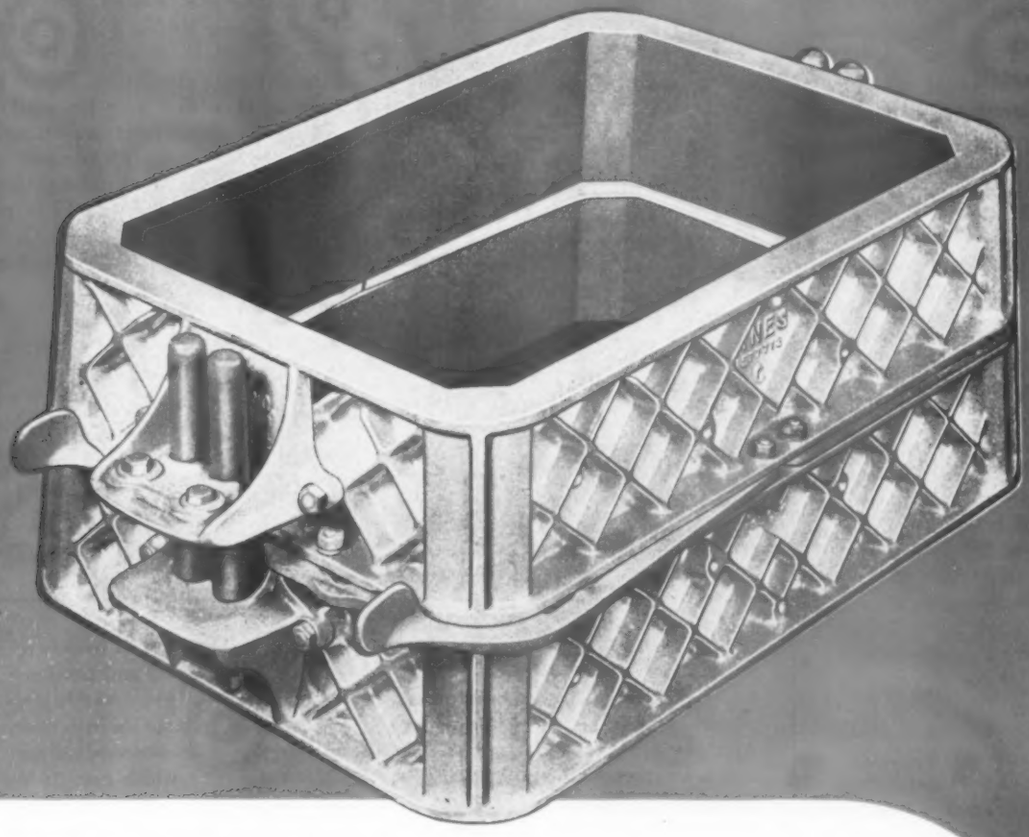
Hines Model "A"

ALUMINUM SLIP FLASK

for light squeezers . . . pattern casting . . . trade schools



METALLIC FLASKS

The Hines Model "A" Aluminum Slip Flask is particularly recommended for light squeezer work, pattern casting and for trade schools. It is much lighter in weight than the ordinary flask, making the molder's work that much easier. It costs less, outlasts other flasks, and reflects credit on an organization that has been exclusively a builder of flasks and jackets over a period of twenty-five years.

All Hines Flasks are fully protected by U. S. and Foreign Patents

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FLASK CO.

CLEVELAND 11, OHIO

Foundry DEVELOPMENTS

MOLTEN heat resistant alloy steels with low freezing points generally have greater fluidity than those with high freezing points according to a report by W. S. Mott and R. H. Schaeffer which is on sale by the Office of Publication Board, Department of Commerce, Washington 25, as PB-16748 (photostat $2; microfilm 50 cents). Study revealed that the freezing points of heat resistant steels have a greater influence upon fluidity than any other factor. Significant differences in fluidity of seven grades of heat resistant alloys and a series of hypoeutectic cast irons were measured. The grades showing the greatest fluidity at any one temperature were those which had been found most useful by foundries for filling thin sections and intricate mold cavities in casting. Increases in carbon content of cast iron were found to result in a drastic lowering of the freezing point and in improved fluidity.

* * *

DISCUSSION presented by H. Y. Hunsicker and L. W. Kempf in a paper entitled "Aluminum Alloys for Bearings" at the June meeting of SAE points out that permanent mold bearings of a 6.5 Sn, 1 Ni, 1 Cu, remainder Al alloy have excellent bearing characteristics and a high resistance to corrosion. Further study led to the development of an alloy containing 6.5 Sn, 2.5 Si, 1 Cu, 0.5 Ni, remainder Al which gave slightly better performance in certan cases. The authors point out that considerable experimental work in the foundry accompanied by radiographic inspection and fatigue testing of castings was required to establish casting conditions which provide precise control of solidification rates and a uniformly high quality product.

* * *

DIRECTIONS for checking metal coreboxes with plaster of paris or gypsum cement are given in considerable detail in a bulletin published by United States Gypsum Co., Chicago. Method described is that of "booking" the two halves. As pointed out, not all gypsum cements are suitable as requirements call for a cement with a long period of plasticity, a setting time of 20 to 25 minutes, sufficient plasticity so that the water will ooze out when pressure is applied, and low expansion to permit removal of the cast from the box. Essentially the method consists in filling the two halves of the boxes, inserting the reinforcements necessary, and watching the setting action. At the proper point (when the mix will not slip when the box is inverted) the two halves are booked, and clamps applied. After setting is complete the halves of the corebox are wedged apart evenly. It is claimed that only a thin fin about 0.01-in. remains at the joint.

* * *

NEW polymer developed by Carbide & Carbon Chemicals Corp. is ethyl silicate No. 40—a light brown, mild odor liquid which undergoes hydrolysis and subsequent dehydration characteristic of pure tetra ethyl orthosilicate. It deposits silica at much lower costs than other ethyl silicates, and is of particular interest as a refractory particle binder. It also may be used for weather-proofing stonework, for formulating special heat resistant surface coatings, and for gelling acetone, ethanol and isopropanol to make solid fuels.

* * *

DEVELOPMENT which appears to have some possibilities for foundry use is a new synthetic resin for impregnating gypsum or plaster of paris casts which strengthens them so that they may be dropped on the floor without breakage, become water resistant and heat resistant up to 200 F. The plastic is an air-setting material produced by combining various thermoplastic and thermosetting resins in any of several solvents. Normally it is transparent, but can be colored with a number of common pigments. Procedure is to immerse the plaster cast in the resin for about ½-hr and dry in open air for 4 hr, or for 20 minutes at 150 F. It is said to cause neither shrinkage or warping. Partial impregnation of a cast may be achieved by shortening the time of immersion. If only a surface coating is desired the resin may be applied by brushing, spraying or dipping. Coating is said to produce a glossy finish like enamel. Cost is about the same as for conventional lacquers and enamels.

* * *

RECENT publication of the Bureau of Mines, Department of the Interior, is designated R. I. 3860 and entitled "Examination and Treatment of Industrial Magnesium Foundry Wastes" by O. C. Garst. Divided into two main sections, the first deals with the treatment of melting-pot drosses, and the second with treatment of foundry dusts. Test data on melting-pot drosses indicate that around 300 lb of metal can be recovered from 2000 lb of dross at a cost of approximately $14. Recovered ingot contains 0.15 to 0.32 per cent iron and can be reduced by refining with manganese chloride flux. Data on recovery of metal from magnesium sawdust shows 92.60 per cent by air-table concentration. The cleaned sawdust melted down under various procedures showed the best to be nasty method with loose sawdust. Recovery was 84.9 against 84.6 per cent using sawdust briquets. E. B.

Reports on a German steel foundry engaged in producing gun barrels reveal several interesting points. Molds were made of quenched and tempered Cr-Mo steel forgings containing 0.35 C; 1.50 Cr and 0.25 Mo. Molds supported by rollers, run in water and are packed by rubber sleeves on both ends. Machines are equipped in such a way that by insertion of an intermediate section a lengthening of the machine results without difficulty which permits insertion of molds of varying length. Hollow bodies from about 8 to 20 in. outside diameter and 10 to 22½ ft long can be produced. Smallest possible inside diameter possible is 2.4 in.

In practice, speed of molds ranged from 600 to 1000 rpm working toward a surface speed of 400 ft/sec. To protect the surface of the mold it is coated with a layer of fine sand 0.2-in. thick. This sand is introduced into the revolving mold by a long slotted pipe and held in place by centrifugal force. Life of molds is 2000 to 3000 castings. In casting tubes of small inside diameter a special refractory lined hot top is used which rotates with the mold. This gives the steel the proper swirl before it enters the mold. The head is torn off hot after solidification. Depending on wall thickness up to complete solidification. the casting process is completed in 18 to 25 minutes. Total time including preparation requires 40 minutes.

CUPOLA TO BULL LADLE

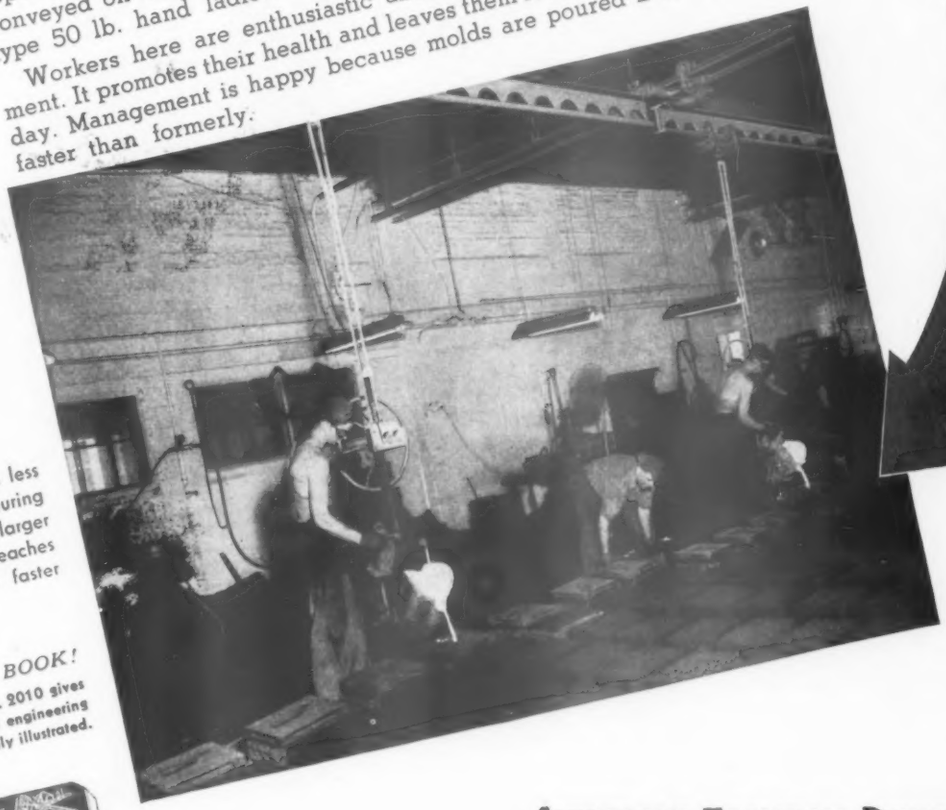
MOLDS POURED 2 to 3 TIMES FASTER

Both workers and management of many foundries are profiting by installations of Cleveland Tramrail. Hard lifting and carrying of heavy ladles are eliminated. Production is speeded and costs cut.

The photographs are of a typical installation. Large molds are poured with bull ladles carrying metal direct from cupola without repouring. Small molds are poured with 200 lb. mechanical ladles conveyed on Tramrail cranes. Four such ladles replaced many old type 50 lb. hand ladles.

Workers here are enthusiastic about Cleveland Tramrail equipment. It promotes their health and leaves them fresher at the end of a day. Management is happy because molds are poured 2 to 3 times faster than formerly.

POURING LADLE TO MOULDS



Heat loss is less because pouring ladles are larger and metal reaches molds in faster time.

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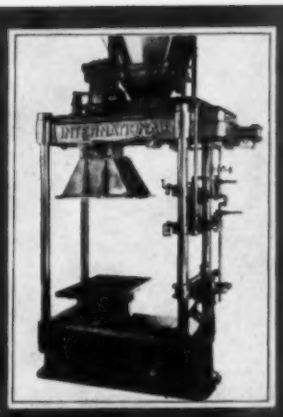
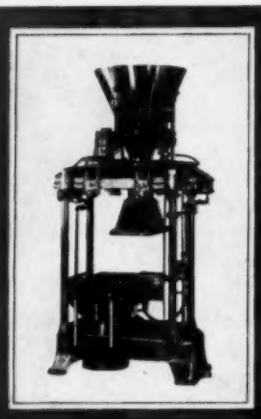
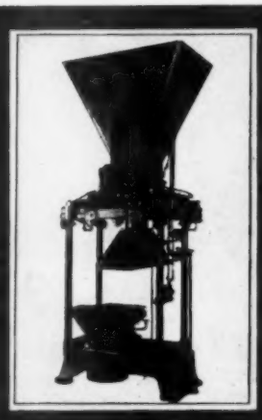
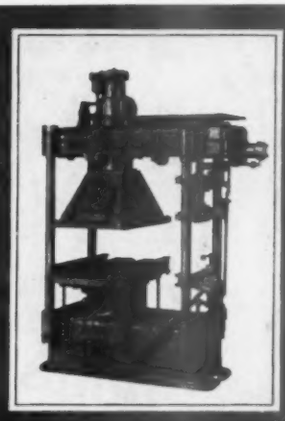
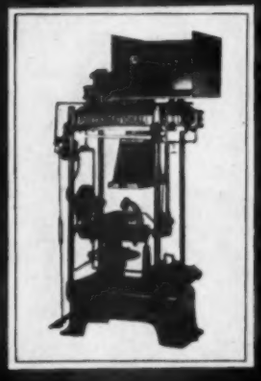
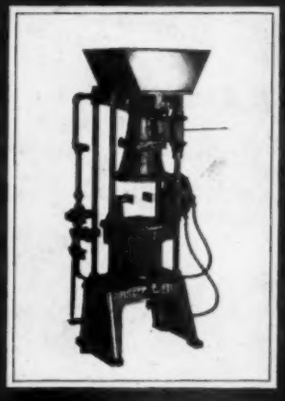
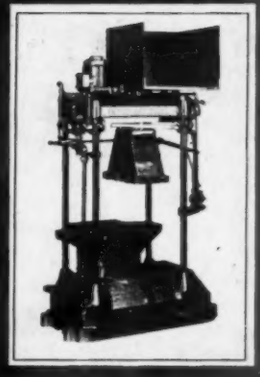
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

INTERNATIONAL CORE BLOWERS

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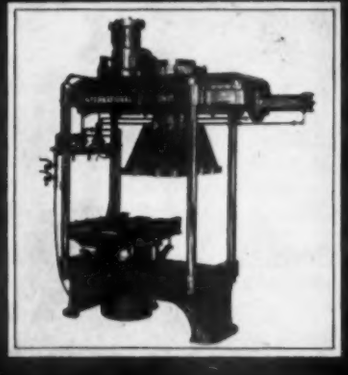
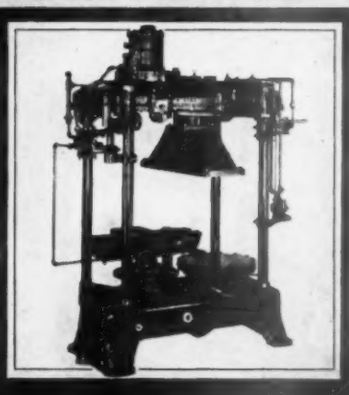
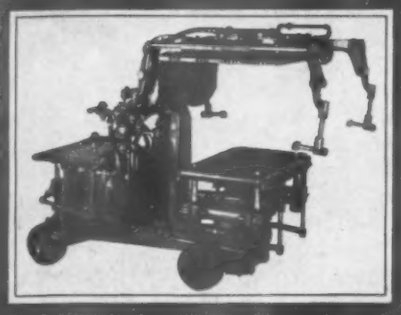
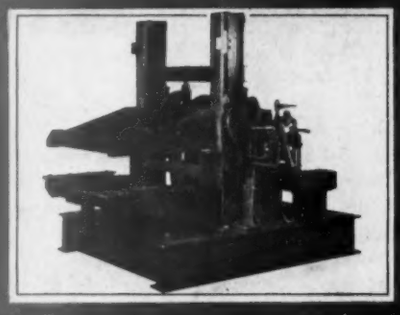
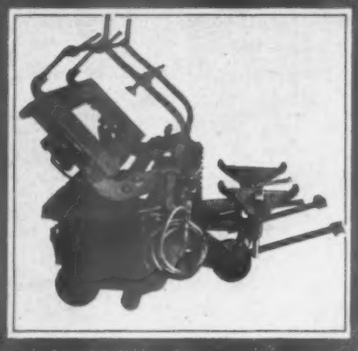
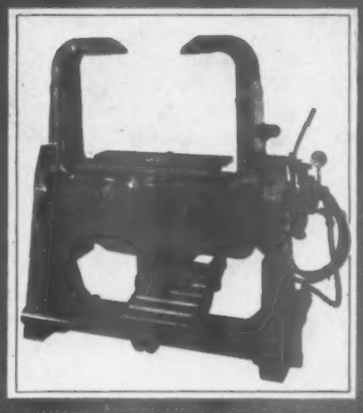




INTERNATIONAL MOLDING MACHINE CO.

INTERNATIONAL MOLDING MACHINES



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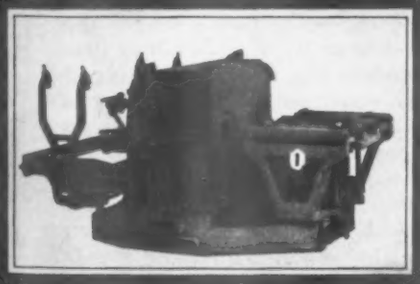
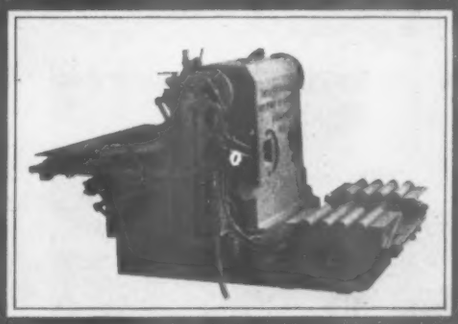
To meet the most rigid accuracy requirements and to continuously maintain *high production* schedules — use

INTERNATIONALS

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STEEL FOUNDERS MEET

In Technical, Operating Conference

FIRST Annual Technical and Operating Conference of the Steel Founders' Society of America was held at the Neil House, Columbus, O., June 13, 14 and 15. Approximately 300 technical and operating men from foundries throughout the United States were present at the two and one-half day meeting.

The morning session on June 13 was devoted to studies on the heading and gating of steel castings. A steel casting was designed to rather difficult engineering requirements by the members of Technical and Operating Group Division I. After the problem casting had been designed and specifications prepared for it which included radiographic and magnetic particle inspection, the group appointed the Dodge Steel Co. to manufacture the casting. Details of pattern cost, man-hours, direct labor for molding and other production items were tabulated by the company. Ten days prior to the meeting in Columbus, blueprint drawings of the casting were sent to all the other Technical and Operating Groups Committees. From these groups, meetings were held and decisions made as to the method under which the groups would suggest how the casting be produced. At the morning session the various committees reported on the methods that they would use in producing the problem casting.

After these presentations J. R. Adams, Crucible Steel Casting Co., and E. C. Troy, Dodge Steel Co., discussed details of casting production and the unveiling of the actual casting as produced by the Dodge Steel Co. and as machined by the Birdsboro Steel Foundry & Machine Co. Discussion on the subject of the problem casting was carried over to the evening and developed into a lively one of several hours duration. The afternoon session was devoted to operating problems of necked-down risers. Four excellent papers on this subject were given by the following: R. T. Leisk and R. O. Tibbals, American Steel Foundries, East St. Louis, Ill.; S. Belus, Burnside Steel Foundry Co., Chicago; H. V. Hites, Ohio Steel Foundry Co., Springfield, O., and J. J. Ewens and E. Biedrzycki, Grede Foundries, Inc., Milwaukee.

The authors of these papers and their foundries brought to the meeting extensive exhibits of castings made by necked-down riser principles, as well as many styles and shapes of necked-down riser cores.

The morning session on June 14 was devoted to a symposium on "Hardenability Specifications." The meeting opened by a review of the hardenability requirements of the Society of Automotive Engineers by C. W. Briggs of the Steel Founders' Society. This paper was followed by a discussion of chemical compositions to produce the SAE hardenability requirements. It was presented by J. B. Caine, Sawbrook Steel Castings Co., Cincinnati. The third paper was one presented on "Procedure in Producing Castings to Hardenability Requirements," by J. W. Juppenplatz, Lebanon Steel Foundry, Lebanon, Pa.

An interesting paper by G. Vennerholm, Ford Motor Co., presented the details of a suggested method of preparing hardenability tests at the furnace to meet SAE requirements. The last paper on the symposium panel was a study of the hardenability of quenched and tempered cast steels by E. J. Wellauer, Falk Corp., Milwaukee. The session prompted considerable comment and questions and it was thought to be the best set of papers and discussions on the hardenability specifications ever had in the foundry industry.

Friday afternoon was devoted to "Safety in the Steel Foundry." The meeting led off with a discussion by E. D. Flintermann, Michigan Steel Casting Co., and president of Steel Founders' Society on safety from the standpoint of Steel Founders' Society and the industry. L. S. Adam, chairman of the Steel Founders' Society Safety Committee, described the safety program being carried on by the Society. An excellent talk on the responsibilities of management in promoting Safety was given by A. L. Grede, Grede Foundries Inc. Mr. Grede stressed the point that only through management's action would a sound safety program be provided in a foundry.

Discuss Safety Program

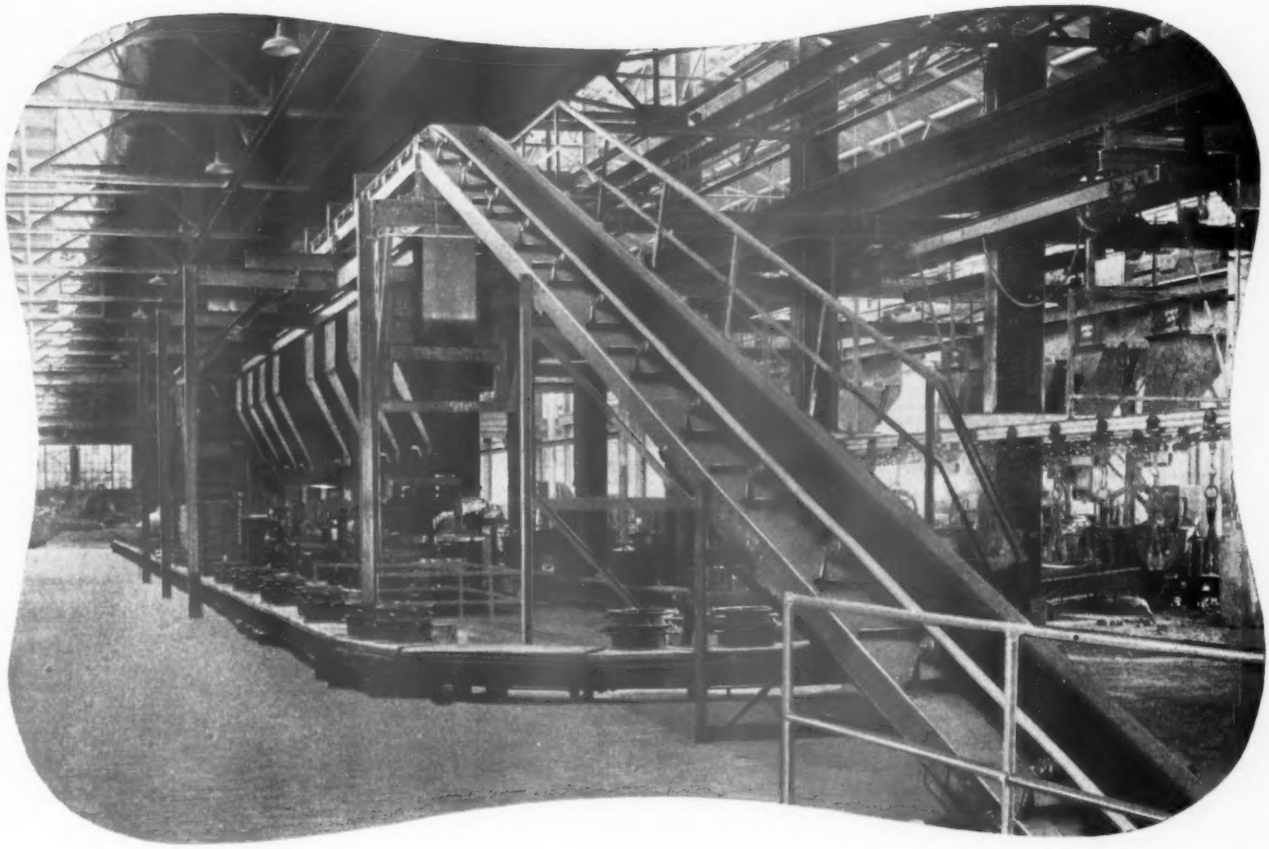
Accomplishment of what could be done in the way of an excellent safety program in the foundry industry was given by L. S. Turner, who discussed the records of the General Steel Castings Corp. concerning safety. R. W. Klee, Ross-Meehan Foundries, presented information on a safety program in an electric steel foundry. The session was concluded by a talk by John M. Roche, director of Industrial Division of the National Safety Council, entitled "Goals to be Attained by a Sound Safety Program and Safety Contest."

The Saturday morning session was devoted to a symposium on nondestructive testing. A review of the recent developments in the magnetic testing of steel castings was presented by W. E. Thomas, vice president, Magnaflux Corp. This interesting review was followed by three papers from men in the steel casting industry concerning the actual testing of steel castings. A discussion of the magnetic particle testing of small steel castings was presented by John O. Shive, Sterling Steel Casting Co. Mr. Shive discussed testing of castings weighing from a few ounces to a hundred pounds.

"Magnetic Particle Testing of Medium Size Steel Castings" was discussed by J. T. Vann, American Cast Iron Pipe Co. Mr. Vann presented extensive information as to the inspection of steel castings weighing up to 100 lb. E. R. Sanford, Penn Steel Castings Co. presented information on the magnetic particle testing of large steel castings. His discussion was centered around castings weighing several tons. The session ended

(*Concluded on page* 138)

SERVICE AWARDS: 76 employees of Farrel-Birmingham Co., Ansonia and Derby, Conn., with company service records of 35 through 49 years were presented with engraved gold wrist watches recently at the annual "Old Timers" dinner. Franklin Farrel Jr., finance committee chairman, made the presentations



Upping Production and Morale

Overhead return of sand, conditioned mechanically to a constant predetermined temper, relieves the molders of tedious lifting, bending, shoveling,— and reduces your own headaches, too. Individually engineered to your particular and individual requirements, Bartlett-Snow sand, mold and castings handling equipment will give you a maximum of both quantity and quality from your plant. Costs go down. Your product finds readier sale. The workmen get larger take home pay—easier—like their jobs better. Absenteeism and turnover are much reduced. And the smoother, more even, more continuous production means bigger profits, larger dividends for you. Can we send you more details?

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ENGINEERING REPRESENTATIVES IN THE PRINCIPAL CITIES

FOUNDRY SAND, MOLD AND CASTINGS HANDLING

(*Concluded from page* 136)

with a very interesting and spirited discussion of "Supersonic Testing of Steel Castings," by J. W. Dice, Sperry Products Inc.

The Steel Founders' Society was host to the members at two industry luncheons given on Thursday and Friday. The Thursday luncheon had as speaker E. D. Flintermann, president of the society, who discussed the technical and operating developments in the industry. He also presented to the members J. B. Caine, who was the recipient of the Technical and Operating Gold Medal Award for 1945. A luncheon speaker Friday was Harry Sain, director of the Department of Safety and Hygiene of the Industrial Commission of the state of Ohio. Walter Wright, Sawbrook Steel Casting Co., chairman of the National Technical and Operating Committee, was toastmaster for both luncheon meetings.

A cocktail party was held on Friday afternoon by the society for the membership. All details of the meeting were under the direction of the National Technical and Operating Committee with Mr. Wright as chairman.

DENSITY IS IMPORTANT

In Proper Sand Control

DENSITY isn't a new word, but its importance is being studied in the foundry and more consideration is given the term. Density is defined as "the ratio of the mass of a homogeneous portion of matter to its volume," or "the computing of weight per unit volume."

The density of sand, after it is rammed into the flask, has a decided influence on other physical properties. With a dense sand, green strength is increased and permeability decreased. Mold hardness is usually increased.

As dense sand weighs more, the foundryman has a splendid opportunity to check this property. For example, weigh two molds, using the same flask, the same pattern and the same sand. If one mold is heavier, the sand will be found to be less permeable, higher in green strength and greater in mold hardness.

Shops have found it practical to paint a single standard flask a bright color. The results obtained by weighing the cope and the drag from this flask, periodically after ramming, serves as a guide in determining the density of the rammed sand and in standardizing the number of jolts at the molding machine.

Convinced of the controlling density, foundries have adopted the ceramic operation of "grain sizing" or the ceramic phrase, "porportioning of the non-plastic aggregate," and are blending various grades of sand to obtain desired physical properties.

The ceramic industry, particularly in the manufacture of firebrick, has long studied and realized the advantages of selected sizes of grog to give density to their top grade firebrick. The foundry industry is beginning to appreciate the same practice of controlling density by blending various grades of sand for the molding.

Base permeability of sand depends on the ratio of sizes, the shape, and the arrangement of the particles. If the sand grains appear as spheres of equal diameter, the volume of pore space is about 43 per cent of the total volume for cubical piling, and only 26 per cent if the grain is hexagonal in shape. Comparing selectively graded sand with sand having grains of approximately equal size, the latter requires more clay bond to fill the pore spaces. In the latter, shrinkage occurs until the large grains touch. After that, the plastic portion of the mass continues to shrink between the grains and may crack either in drying or when the metal is poured into the mold. This increases the internal pore space and causes a rough exterior surface due to the projection of the silica grains, between which lie concave surfaces of the plastic bond. Such a condition may cause penetration or burn-in

With the bentonite portion acting as a film on the sand surfaces, the greatest density is obtained by selective grading, i.e., using the greatest quantity of maximum-sized grains and filling the voids with the next smaller particles that do not crowd or elbow the larger grains out of their most compact arrangement. The intermediate sizes must be removed.

The medium sized sand grains should be the maximum for their position and, in turn, their void spaces filled with smaller particles, etc., until finally the size of the bonding agent is reached. A small percentage of fines does not condemn a sand; it is when the concentration of fines exceeds safe limits that trouble occurs.

Common grading or screening of sand produces a gradation of sizes, each of which attempts to elbow the next larger size out of its most compact arrangement, and some screened sand may be out of graded porportion when received.

The foregoing theory is given only to illustrate the tendency of progressive foundries toward a finer, more carefully graded and denser sand. It has been proved that coarse sand and fine sand yield greater strength than intermediate sized sands and it is emphasized that the AFA Fineness Number has little significance when comparing sands, as it is better practice to compare actual screen analysis.

From a booklet, *Foundry Sand Practice*, by Clyde A. Sanders, engineer, American Colloid Co., Chicago.

Bulletin Describes Facilities

Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., has prepared a 48-page bulletin showing selected views of its foundry facilities at Muskegon, South Haven, Lansing, Mich., and Bettendorf, Iowa. Excellent photographs and paintings portray scenes in sand, physical and chemical laboratories, corerooms, cleaning departments and furnace rooms. Views showing converters, coreblowing machines, electric furnace melting equipment and pouring ladles in action give the reader an opportunity to observe production of cast crankshafts, camshafts, centrifugally cast cylinder liners, centrifuse brake drums, cylinder blocks and heads of intricate design.

Industrial Hygiene Foundation To Meet

Annual meeting of the Industrial Hygiene Foundation, an association of industries for the improvement of physical working conditions and advancement of industrial health, will be held Nov. 7, at Mellon Institute, Pittsburgh, the foundation's headquarters. Round-table conferences will be held Nov. 6 and 8, the days before and after the general session. These conferences, limited to representatives from member companies, are intended for physicians, engineers and chemists concerned with maintenance of health in industry.

Foundry Congress To Be Held in Paris

The 20th Annual Congress of the Technical Foundry Association will be held in Paris, starting Oct. 18, it has been announced by P. Bastien, president of the French Foundry Association. The congress is planned for two days, each of which will include two sessions, and the program is expected to include an exchange paper from the American Foundrymen's Association.

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ARC WELDING PRACTICE

For Gray Iron Castings

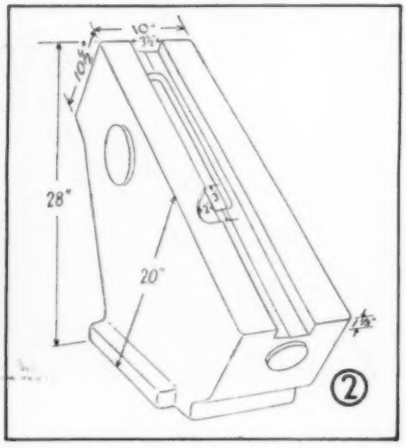

Fig. 1—Casting with cavity filled by arc welding. Fig. 2—Principal dimensions of the casting and cavity.

ALTHOUGH the variety of practical and economical applications of the metallic arc welding process to the salvage of defective, worn or broken gray iron castings is very large, this does not mean that every new job presents an entirely different problem. Long experince in this field of reclamation welding has shown that most jobs can be quickly identified as belonging to a certain group and that the correct procedures for all jobs in any group will differ only in certain details.

One general classification includes castings which require building up with additional metal in certain areas. These jobs can be subdivided into typical groups which, in turn, require (1) a restoration of lost metal as in broken gear tooth, (2) the filling of a cavity as in a porous or defective casting, (3) building up a surface which has been worn away or incorrectly machined, or (4) putting on metal to accommodate a change in design. These are some of the most frequently encountered build-up jobs; there are, of course, many others.

An important common factor in all of these build-up operations is the need for avoiding hardness in the deposited metal, in the line of fusion and in the heat affected zone of the parent metal. Many so-called failures have been reported, even when the correct electrode material has been used, and investigation has usually disclosed that these failures were caused by lack of any effort to make the deposit in such a manner as to preserve the full machinability of the casting. In other words, the chief difficulty encountered has been the development of hard spots on account of not using the correct procedure.

The experienced arc welder working on ordinary steel usually "digs in" or tries to get good penetration and, at the same time, uses as large an electrode as the work will stand, in order to reduce welding time. Such arc welding procedure will not produce machinable deposits on gray iron castings, because it overheats the metal so that it is easily chilled and also allows the deposited metal to pick up impurities from the parent metal. Chilling of the overheated castings, of course, results in the formation of hard carbides, which give trouble in machining. A good welding operator working with any good material usually can avoid porosity and checking in the deposit. Therefore, the thing he has to learn for the correct building up on cast iron is to avoid chilling, and thus to produce a fully machinable deposit, provided that he uses electrode material which makes that result possible.

A specific case, in which it was necessary to watch the effect of the heat on the parent metal, is illustrated in Fig. 1. This is a job which could be done in two different ways according to the position of the work. The dimensions of the casting and the location of the weld are shown in Fig. 2. The casting weighed about 500 lb, and an approximately semicircular notch 3 in. long, 2 in. wide and ⅜-in. deep has been milled alongside one of the machined ways. It was required to fill this notch and to avoid the development of any hard spots which would make subsequent machining difficult.

The electrode used for this job was Phillips "600" electrode, a fabricated nonferrous rod having a nickel core wrapped in a sheath of thin copper strip and covered with a slag shielding coating. This rod is designed especially for making metal arc deposits on cast iron which will be fully machinable and of the same color as the casting.

The application is classified as a fill-in job. There are two sharp corners to watch —one around the top of the notch, and another along the straight edge of the notch at the bottom. This is a case where a welder on steel would not hesitate to dig into these corners with his arc in order to get good penetration. When welding on cast iron, the most important point of procedure in this type of application is to avoid digging into the corner, because hard spots due to chilling are certain to result.

With the work in the inclined position, welding was started in the lower corner and ⅛-in. from the edge. The first bead was carried only part way around the arc of the cavity. Three additional beads of about the same length were deposited.

(*Concluded on page 142*)

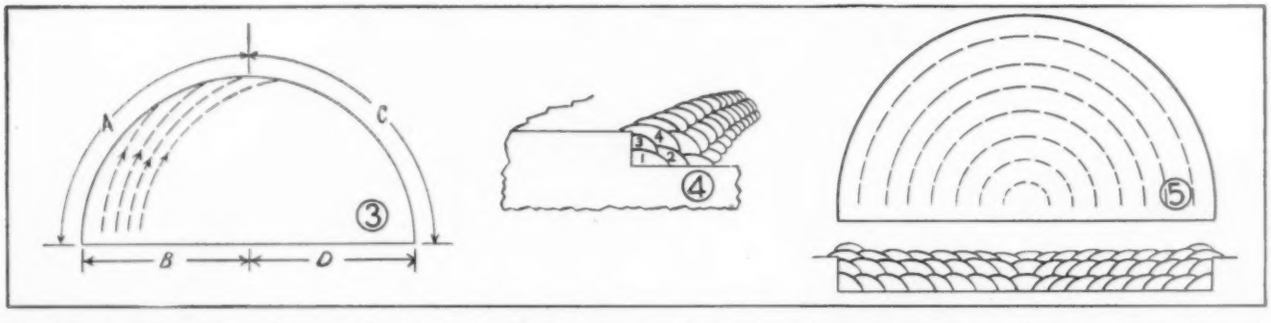

Fig. 3—Procedure followed for welding in inclined position. Fig. 4—Section of bead deposit, showing how breakdown of sharp corners was avoided. Fig. 5—Welding procedure for flat position

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The continued importance given to AQUA-BOND No. 310 Liquid Core Binder for its excellent performance is no accident. Careful laboratory and foundry testing developed AQUA-BOND to a point where success was assured. Cores produced with AQUA-BOND No. 310 have a more even cross sectional strength. Less heat and less baking time are required; gas is reduced to a minimum; it keeps cores open and well vented throughout; it is clean in the core boxes and clean on the hands of the core maker and cores are stout enough to resist the normal washing action of hot metal. AQUA-BOND is an emulsified type of oil and possesses so many important properties that we believe you should know about them. We will be glad to furnish complete information at your request. Write Today!

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(*Concluded from page* 140)

Fig. 3 indicates at *A* the approximate length of these deposits, and Fig. 4 shows how the beads overlapped. In the case of each bead after the first, the arc was always held largely on the previous deposit, and care was always taken to thoroughly clean away the slag from each bead before depositing the next one. By this time, there was a shoulder formed on which additional beads were deposited to build up slightly above the original level.

When the cavity was about half filled, the edge was warmed sufficiently so that beads could be deposited along the area indicated at *B* in Fig. 3, without danger of chilling. The upper half of the cavity (Fig. 3-*C*) was filled in the same manner, finishing with a deposit along the edge at *D* in Fig. 3. One final bead was then deposited around the edge of the cavity to provide plenty of material for machining. This appears in Fig. 1 as a narrow ridge around the contour of the cavity.

The precautions observed in carrying out this procedure were: (1) To clean out slag thoroughly between deposits. (2) To hold the arc mostly on the deposited metal. (3) To avoid letting the arc play on sharp corners.

By following this procedure, it was possible to make this repair without preheating, which might have warped the casting. The job machined perfectly without encountering hard spots or porosities. In conclusion, it might be pointed out that the details of procedure are based upon the known effects of heating on gray iron castings, and on the necessity for keeping the work clean when it is desired to produce a deposit which will be clean and sound.

Weld in Flat Position

If this cavity were to be welded in the flat position, the procedure would be as follows:

1. Start the first bead on the inside of the corner; that is, at the root of the angle. The starting point should be ⅛ or 3/16-in. away from the edge, so as not to melt the edge, and the deposit is carried around the root of the angle to within about ⅛ in. of the other end. (See Fig. 5).

2. Clean all slag from the first bead.

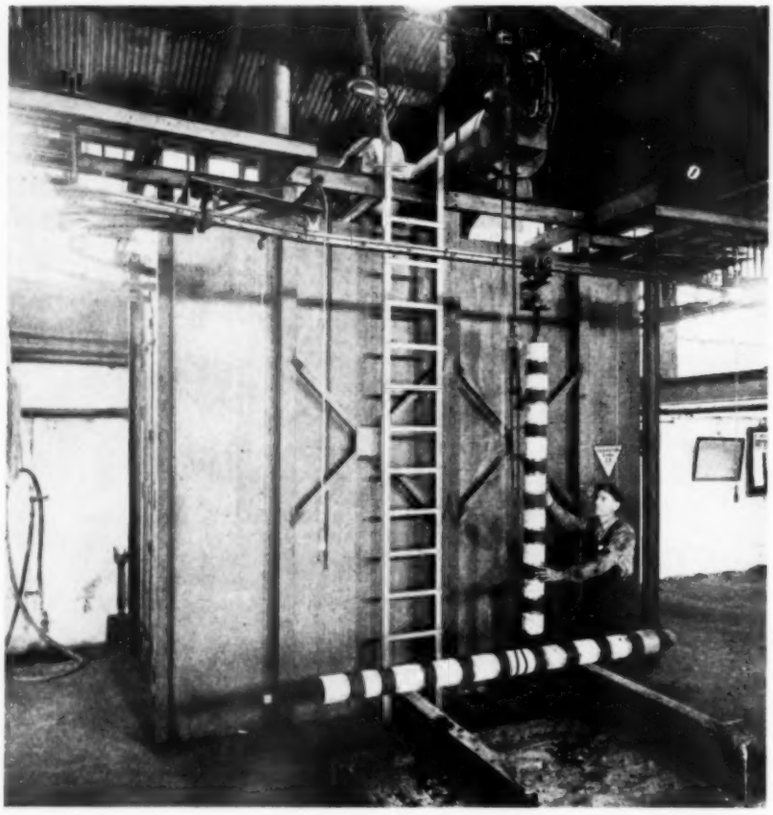
3. Apply second bead inside the first, as shown in Fig. 5, holding the arc on the first bead so that about 75 per cent of the heat is applied to the previous deposit and only about 25 per cent affects the parent metal. This procedure avoids both porosity and hardness.

4. Clean all slag from the second bead and repeat until one layer of beads has been laid over the bottom of the cavity.

5. The metal at the edge will now be warm enough to remove danger of chilling, so that the final bottom bead can be laid along the edge, again holding the arc mostly on the deposited metal instead of allowing it to play on the sharp edge.

The second layer, and other layers to fill, can be deposited with the same procedure. The welding is finished by depositing one bead around the top, holding the arc entirely on the previously deposited metal, and not allowing the deposit to flow over onto the parent metal. This final bead has an annealing effect on the parent metal near the edge and also insures having sufficient build-up so that the casting will machine perfectly.

Stopper Rods Dried in New Type Oven

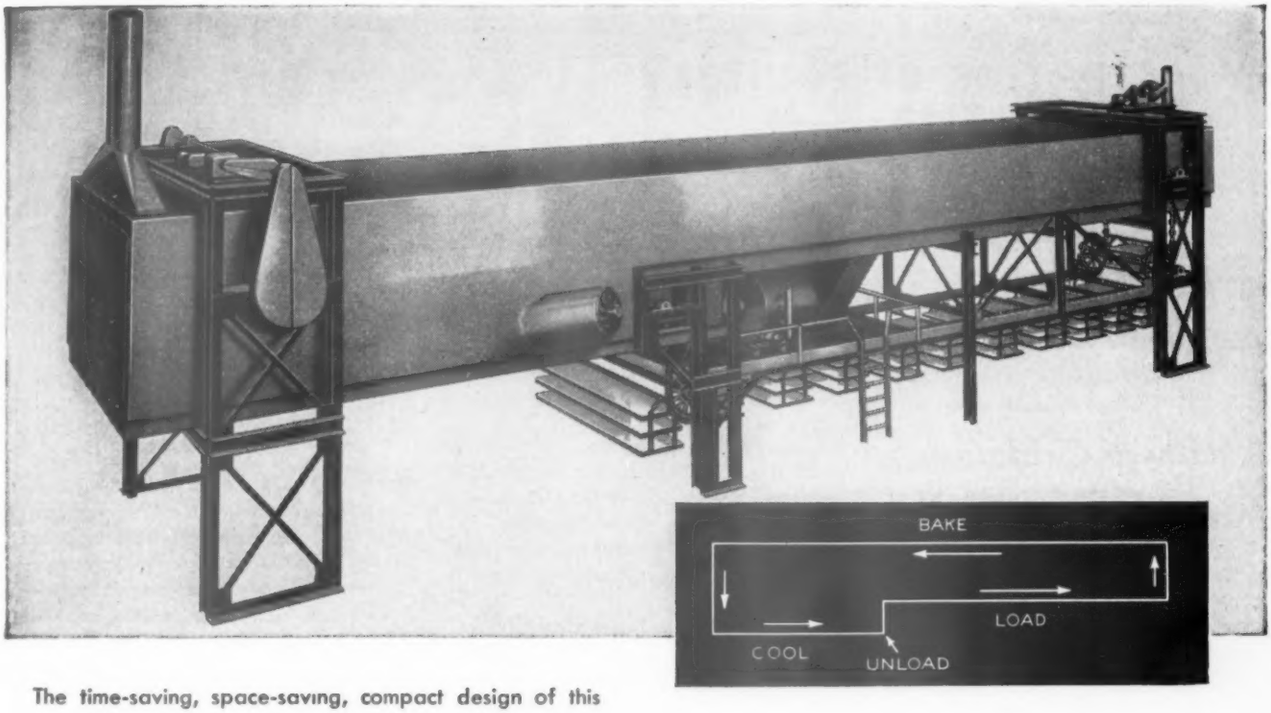


MORE thorough drying of ladle stopper rods and a more convenient and efficient method of handling the drying operation has been accomplished by the Scullin Steel Co., St. Louis, through the use of a new type of recirculating convection oven. It also eliminates a hazard to workers through use of improperly dried rods. Formerly the rods were dried by means of torches or small wood fires; this drying was spotty and the rods were not always ready when required.

With the new oven, installed by the Despatch Oven Co., Minneapolis, stopper rods are loaded individually on trolleys in a vertical position, as shown here. These trolleys, through a switch arrangement, load the rods on three tracks running the length of the oven. Each track also has an individual door at the oven's unloading end. As the rods are removed from the oven, the trolleys return on a track along the oven to loading doors.

Rods are pushed through the oven manually; generally after one is removed another replaces it at the opposite end of the oven, thereby permitting rods always to be available at the right temperature and thoroughly dried. With interior working dimensions of 6 ft wide, 20 ft long and 10½ ft high, this oven has capacity for 69 rods at one time. Approximately 20 rods are used daily, giving each rod a drying time of two or more days at an average temperature of 350 F. Higher temperature may be provided if necessary for quicker drying, the oven having a maximum temperature range of 425 F. Temperature control is entirely automatic.

The oven has an externally mounted heater. Heated air is introduced into the oven through special duct work at the bottom of the work chamber, with a recirculating duct at the top. A separate vent removes moisture-laden air.



The time-saving, space-saving, compact design of this new Horizontal Core Oven is characteristic of Young Brothers' Engineering. Into it went the skill and confidence of many years of experience . . . also a thorough knowledge of the job to be done and the production problems involved.

This new core oven can be installed in practically any building without making any major structural changes.

The coremakers are located right next to the oven so that they can load the cores directly on the moving racks thus eliminating the necessity of transporting them on hand trucks or a conveyor from the core room. The location of the coremakers, at the oven, also saves core room space.

The size of the loading racks can be varied and the shelves can be adjusted to accommodate cores of many sizes and shapes.

Besides allowing for the removal of exhaust gases at the point of greatest concentration, the new oven design provides an effective cooling zone for the cores and assures comfortable working conditions for the coremakers.

This New Horizontal Core Oven is Young Brothers' answer to the demand for better core baking equipment. It is YOUR answer to the need for lower production costs and higher operating efficiency.

New HORIZONTAL CORE OVEN . . . . .

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Activities of foundry GROUPS

Southern California

NOTWITHSTANDING advent of summer weather in the Los Angeles area, the 1945-46 season's last regular meeting of the Southern California Chapter of the AFA at Rodger Young Auditorium, Los Angeles, June 14, was well attended. Apparently the management of the auditorium considers the AFA crowd "regulars," since a fine meal was served. Spirit of the occasion was enlivened by the fine music of Jewell Kincer's trio.

A technical program was provided, Harry A. Schwartz, National Malleable & Steel Castings Co., Cleveland, ably handling the subject "Solidification of Metals." Paul Siechert, metallurgist, Alhambra Foundry Co. Ltd., Alhambra, added some bright touches to the discussion. From the response aroused it was judged that foundrymen give much thought to the subject of solidification of molten metal in the mold.

Officers and directors to serve the chapter for the 1946-47 season were installed at this meeting. Officers include: President, William D. Emmett, Los Angeles Steel Casting Co.; vice president, Henry E. Russill, Eld Metal Co.; secretary, Leonard O. Hoffstetter, Brumley-Donaldson Co. (all of Los Angeles); treasurer, Earl Shomaker, Kay-Brunner Steel Products Inc., Alhambra. Directors elected to serve for two-year terms are: J. B. Morey, International Nickel Co. Inc.; John E. Wilson, Climax Molybdenum Corp.; Lester Rankin, Alameda Mfg. Co.; Roy Nash, Magnesium Products Co.

Annual outing and picnic of the chapter will be held Aug. 10 at Lakewood Country Club, North Long Beach.—*J. B. Morey, publicity chairman.*

Central Ohio

CENTRAL Ohio Chapter of the AFA held its final meeting of the 1945-46 fiscal year May 27, at the Chittenden Hotel, Columbus, O., with an attendance of 80 members and guests. Following dinner, new officers were elected and are as follows: Chairman, Norman J. Dunbeck, Eastern Clay Products Inc., Eifort, O.; co-chairman, R. H. Frank, Bonney-Floyd Co., Columbus, O.; secretary, J. S. Schram, Swan-Finch Oil Co.; treasurer, Walter Deutsch, Ohio Malleable Iron Co., Columbus, O.

Directors for one year include: Karol Whitlach, Aetna Fire Brick Co., Oak Hill, O.; H. R. Warsmith, Jeffrey Mfg. Co., Columbus, O.; F. O. Lemmon, Ohio Steel Foundry Co., Springfield, O.; and Tom E. Barlow, Battelle Memorial Institute, Columbus, O.

A round-table discussion was held on melting practice in which the steel section was led by Floyd Lemmon, and the iron section by Harry Warsmith.—*M. B. Millar.*

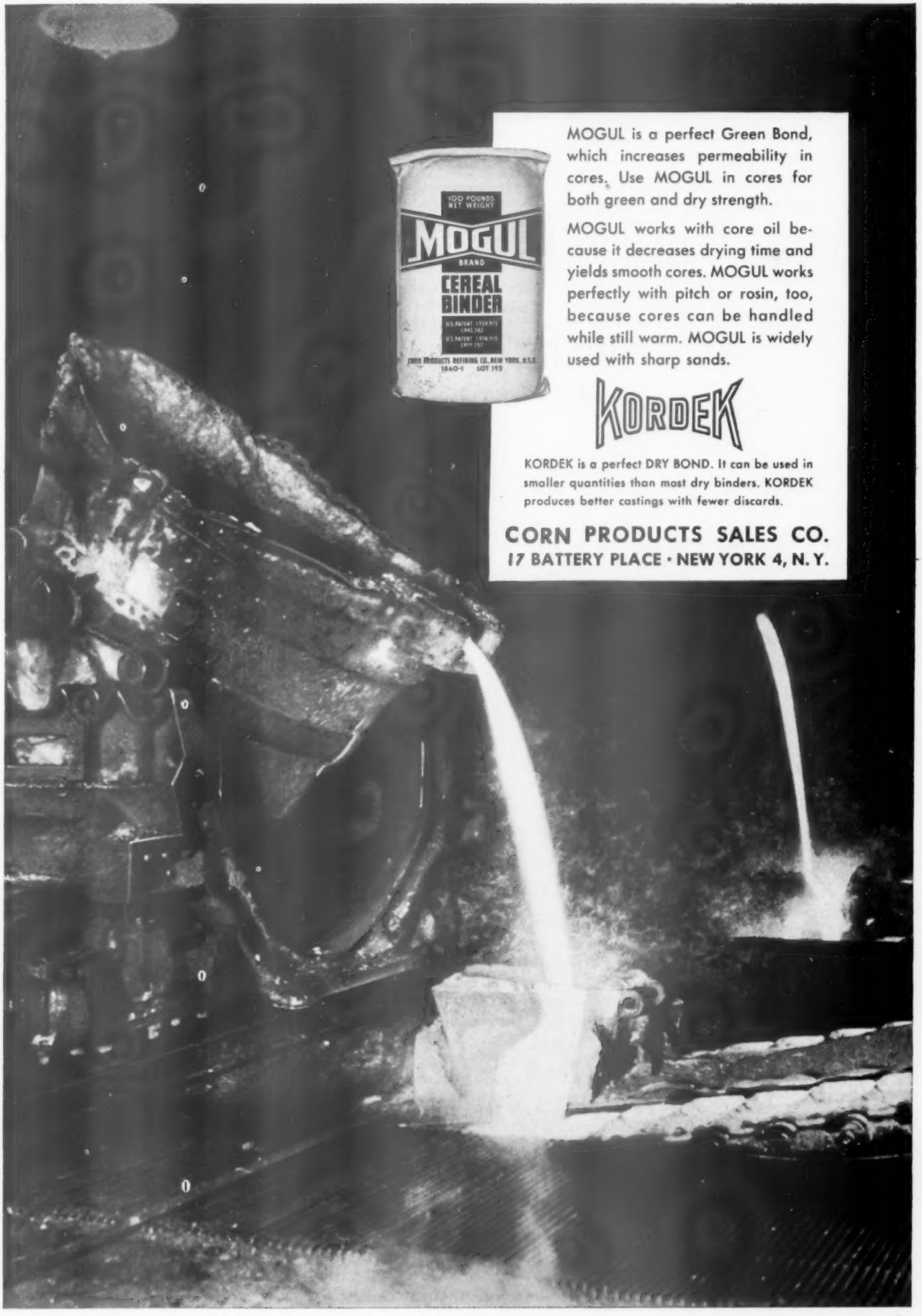
Northwestern Pa.

EARL Strick, chairman of the Northwestern Pennsylvania Chapter of the AFA for the year 1946-47, has announced the appointment of the following to serve on organization committees: Program—John Clark, chairman, Fred Eisert, Darrell Ottaway, Tom Beaulac, George Johnston. By-Laws — Roger Griswold, chairman, Clarence Fitz, Kenneth Guyer. Membership—William Miller, chairman, Bailey Harrington, George Johnstone, Tom Beaulac. Attendance — Ralph Wedgwood, chairman, Joseph Pace, Frank Warner, Theodore Fritz. Entertainment — William Bartels, chairman, Fred Carlson, James J. Farina.

Technical Education — Larry Dunn, John Metcalf. Technical Development—Roger Carver, Joseph Shuffstall. Publicity—Jack Gill, L. W. Kingsbury. Reception — Frank Volgstadt, chairman, Stephen Stroup, Clyde Cooper, Harry Hatch. Top Management—R. W. Britton, chairman, LeGrande Skinner, Paul Vincent, William Forster, Milton Rowley, W. I. Johnson, Frank Brinnig, J. S. Horn-

(*Continued on page* 147)

NEW JERSEY: Participants in the second annual outing of the New Jersey Foundrymen's Association which attracted 175 members and guests to the Crestmont Golf Club, West Orange, N. J., on June 20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1860-1 LOT 193
MOGUL is a perfect Green Bond, which increases permeability in cores. Use MOGUL in cores for both green and dry strength.
MOGUL works with core oil because it decreases drying time and yields smooth cores. MOGUL works perfectly with pitch or rosin, too, because cores can be handled while still warm. MOGUL is widely used with sharp sands.
KORDEK
KORDEK is a perfect DRY BOND. It can be used in smaller quantities than most dry binders. KORDEK produces better castings with fewer discards.
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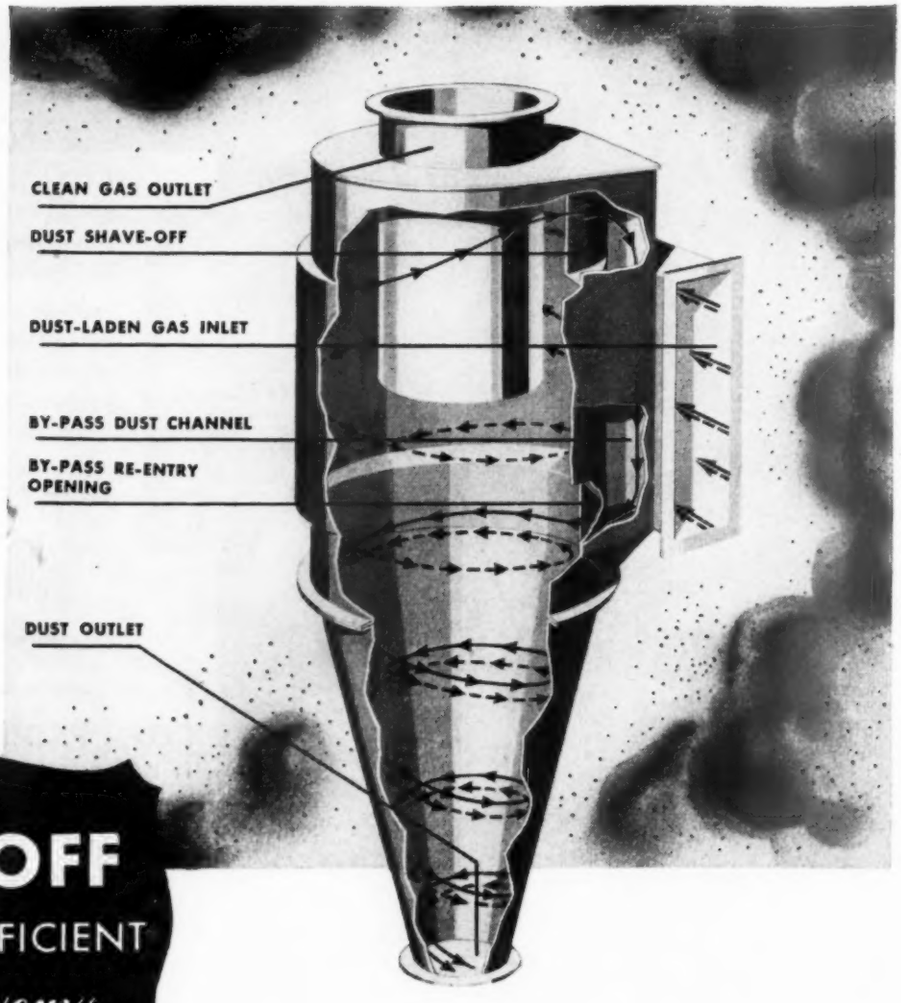

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The "shave-off" thus enables Buell to achieve high recovery efficiency without resort to small-diameter cyclones —and Buell's large diameters permit construction of extra-thick steel, efficient operation with low centrifugal force fields, and consequent reduction of abrasive wear. These are major reasons why Buell Dust Recovery Systems in use three, four, five or more years have established outstanding records for trouble-free service and low maintenance cost.

Buell's book—"The van Tongeren System of Industrial Dust Recovery"—illustrates and explains the patented van Tongeren principle and its many applications to industry. We will be pleased to send you a copy without charge.

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DUST RECOVERY SYSTEMS

(*Continued from page* 144)

stein, Ely Griswold, J. H. Piper, Herman Zwicker, Charles Jarecki. Chapter Photographer—Chester Gleba.

A summer outing is being planned for August. First technical meeting of the fiscal year is to be held in the Moose Club, Erie, Pa., the fourth Monday in September.

Canton

MAY 23 meeting of Canton District Chapter of the AFA closed its second year, with the roster showing many new members. The meeting, held at Mergus Restaurant, was attended by 84 members and guests. Zigmond Madacey, Caterpillar Tractor Co., Peoria, Ill., was guest speaker, and gave an interesting talk on "Core Blowing." Mr. Madacey brought out a number of advantages in forming cores by this method, notably speed of production, uniform quality and accuracy of dimension. Sand control was discussed at length since it plays such an important role in eliminating core troubles.

William W. Maloney, national secretary of AFA, described the future plans of the association and its place in industry as well as its policies and objectives.

Officers for the year 1946-47 were presented by the retiring president, H. G. Robertson, and are as follows: Chairman, I. M. Emery, Massillon Steel Castings Co., Massillon; vice chairman, Charles F. Bunting, Pitcairn Co., Barberton; secretary, Chester B. Williams, Massillon Steel Castings Co.; treasurer, Otis D. Clay, Tuscora Foundry Sand Co., Canal Fulton. Directors for the three areas of the chapter include: Central — Karl F. Schmidt, United Engineering & Foundry Co.; Theodore M. Dubs, Canton Pattern & Mfg. Co.; M. J. Winters, Winters Foundry & Machine Co. (all of Canton). Eastern—H. G. Robertson, American Steel Foundries, Alliance; C. J. Trump, Machined Steel Castings Co., Alliance; Fred C. Glass, Deming Co., Salem. Western—Robert Cairnie, Orrville Bronze & Aluminum Foundry Co., Orrville; Charles W. McLaughlin, Lectromelt Steel Castings Co., Barberton; E. H. Taylor, F. E. Myers & Bros. Co., Ashland.—*Nils E. Moore, reporter.*

Western New York

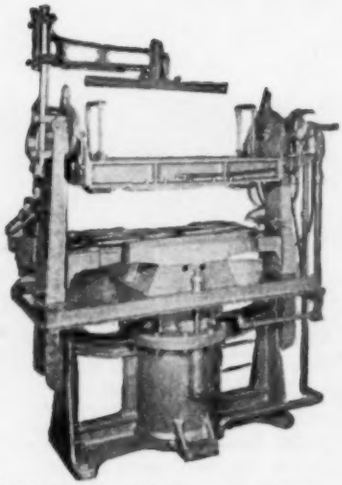
JUNE 15 marked the annual picnic and election of officers of Western New York Chapter of the AFA, held at Kudara Farms, Hamburg, N. Y., with about 300 in attendance. Beautiful weather helped to make the outing a grand success. Games of skill, including horseshoe pitching contests and soft ball, provided entertainment and excitement. Refreshments and a buffet lunch were served from 2 until 8 p.m. Picnic activities were under the direction of J. Ralph Turner, Queen City Sand & Supply Co., and his committee.

Picnic activities were interrupted at 5:30 p.m. when Arthur H. Suckow, chapter chairman, presided at the annual meeting, and presented the newly elected officers and directors. They are: Chairman, Henry C. Winte, Worthington Pump & Machinery Corp., Buffalo; vice chairman, Elliot R. Jones, Lumen Bearing Co.,

(*Continued on page* 150)

DETROIT FOUNDRYMEN turned out in force for the Golden Jubilee Foundrymen's Outing of the Detroit Chapter, AFA. The annual affair was held June 22 at the Forest Lake Country Club with an attendance of more than 400

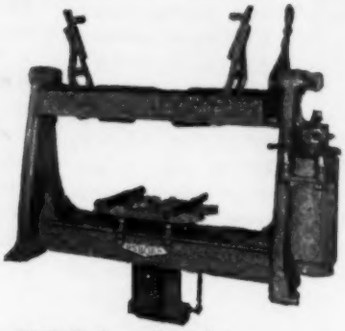
#193 Osborn Blower, draw piston type



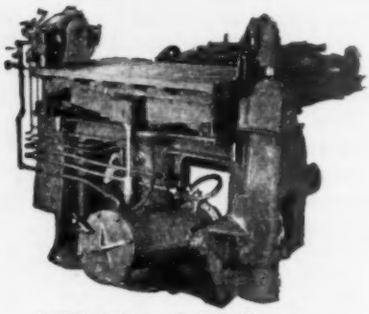
#333 Osborn Jolt-Squeeze Rollover

#94 Osborn Core Blower

#442 line Jolt Rockover Machine



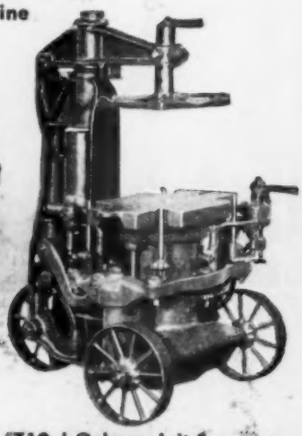
#146 Osborn Core Box Drawing Machine



#405 Osborn Jolt Rollover

#539 Osborn Jolt Strip Machine

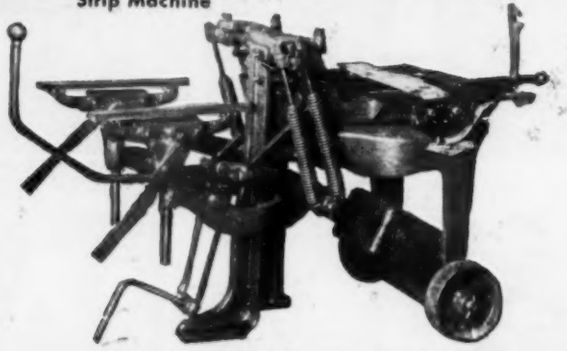
#559 Osborn Jolt Strip Machine



#710-J Osborn Jolt-Squeeze Strip Machine

#210-PJ Osborn Jolt Squeeze Machine

#413 Osborn Jolt Rollover



#42 Osborn Hand-Operated Rockover Core Machine

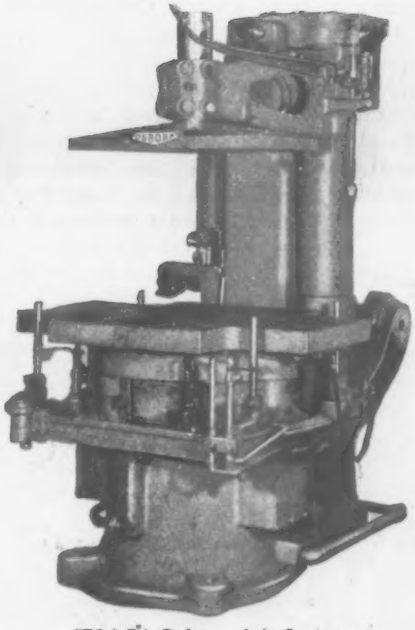
Many types not illustrated. Write or wire for complete information.

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue Cleveland, Ohio

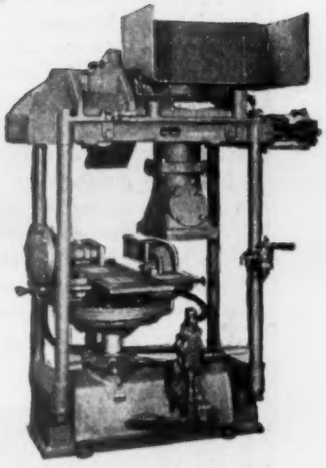
OSBORN features the MOST COMPLETE LINE OF MOULDING and CORE BLOWING EQUIPMENT for foundries

#275-J Osborn
Jolt-Squeeze Machine

#1024 Osborn Jolt-Squeeze
Strip Machine



#724-PJ Osborn Jolt Squeeze
Strip Machine



#93 Osborn Core Blower

MEMBER

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

OSBORN

MOULDING MACHINES

CHESAPEAKE: H. J. Williams (left), New Jersey Silica Sand Co., addressing Chesapeake Chapter, AFA. Right, David Tamor, American Chain & Cable Co., chapter vice chairman. (Photos by E. T. Myskowski, Naval Research Laboratory)

(*Continued from page* 147)

Buffalo; secretary, Leo A. Merryman, Tonawanda Iron Corp., North Tonawanda; treasurer, Martin W. Pohlman, Pohlman Foundry Co. Inc., Buffalo. Directors to serve for three years include: John C. Nagy, Charles C. Kawin Co.; Leo C. Smith, Lakeside Bronze Inc.; and John R. Wark Queen City Sand & Supply Co., all of Buffalo. Arthur H. Suckow becomes a director for one year.

Chairman Suckow, in presenting the gavel to his successor, Henry C. Winte, thanked the members for their excellent co-operation during the last year. Frank E. Bates, a past chairman, presented a pin to Mr. Suckow in appreciation of his efforts in directing chapter activities so successfully during the year.

On May 25 the spring dinner dance of the chapter was held at the Buffalo Trap & Field Club, Buffalo, with an attendance of about 200 members and guests. A turkey dinner was served followed by dancing.—*Leo A. Merryman, secretary.*

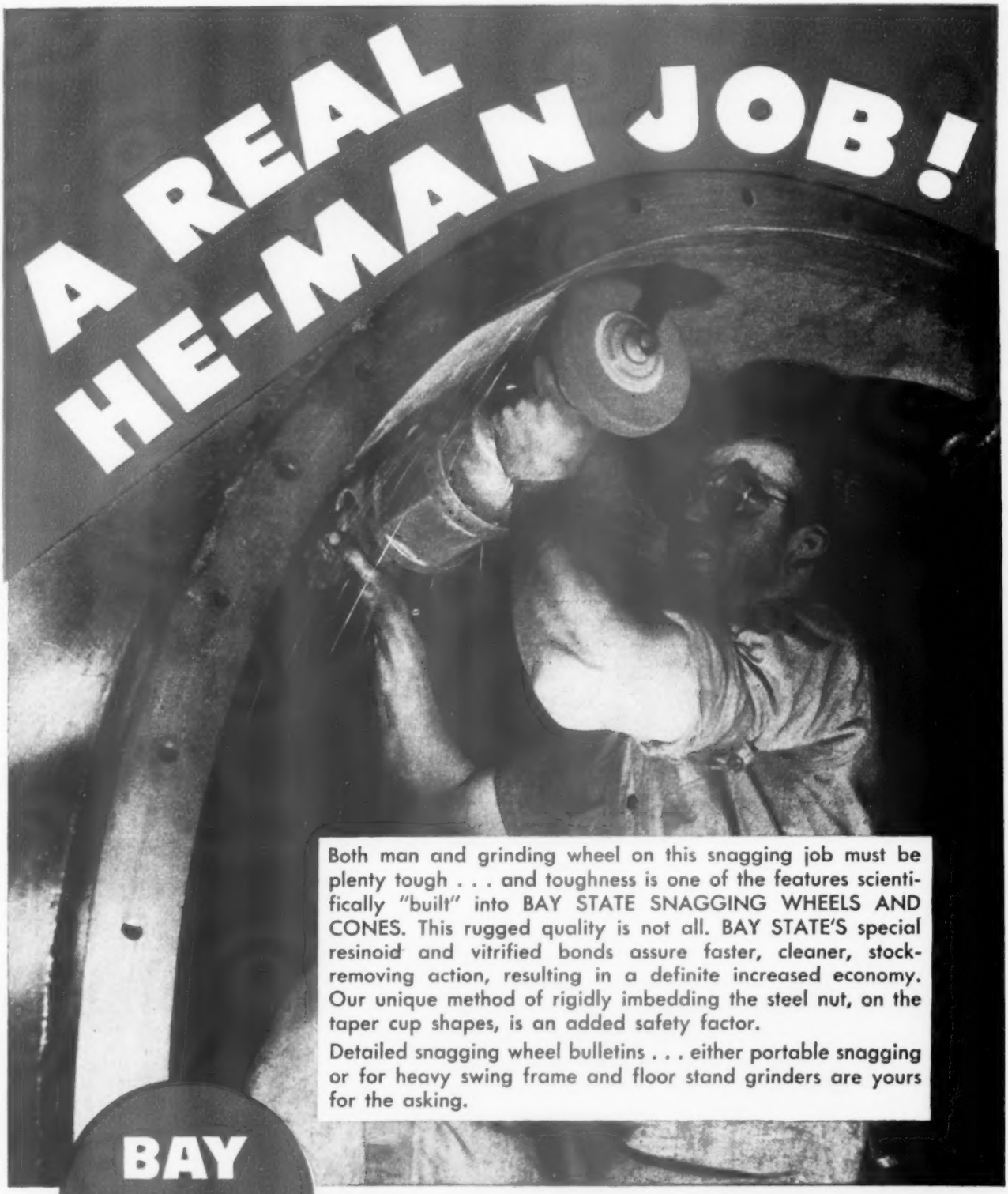
Eastern Canada and Newfoundland

ANNUAL meeting of the Eastern Canada and Newfoundland Chapter of the AFA was held May 1, at the Mount Royal Hotel, Montreal. Reports were presented by various committee chairmen, outlining their work during the last year. G. Ewing Tait, chapter chairman, gave a summary of the year's activities, including a brief report on the national congress of the American Foundrymen's Association, held in Cleveland.

Following a successful year in apprentice training, prizes were awarded to winners of the apprentice contest, held in March, under the joint auspices of the American Foundrymen's Association and the Montreal Technical School. The following led their respective classes: Patternmaking, 2nd, 3rd and 4th years, R. Theriault, Montreal Technical School; L. Messier, Acme Pattern & Woodworking Co.; G. Marquette, Montreal Technical School. Iron Molding, 2nd, 3rd and 4th years, L. Limoges, Melanson Foundry; M. Tamburine, Warden King Ltd.; H. Lalonde, H. Walford Ltd. Nonferrous molding, 2nd, 3rd and 4th years, E. Jones, Empire Brass Foundry; P. Blais, Montreal Technical School; C.

(*Continued on page* 152)

NORTHERN CALIFORNIA: Assembled members and guests of Northern California Chapter, AFA, on the occasion of the group's Old Timer and Apprentice Night on May 16. A record audience was present



Both man and grinding wheel on this snagging job must be plenty tough . . . and toughness is one of the features scientifically "built" into BAY STATE SNAGGING WHEELS AND CONES. This rugged quality is not all. BAY STATE'S special resinoid and vitrified bonds assure faster, cleaner, stock-removing action, resulting in a definite increased economy. Our unique method of rigidly imbedding the steel nut, on the taper cup shapes, is an added safety factor.

Detailed snagging wheel bulletins . . . either portable snagging or for heavy swing frame and floor stand grinders are yours for the asking.

BAY STATE ABRASIVE PRODUCTS

Top Performance Consistently Duplicated

BAY STATE ABRASIVE PRODUCTS CO. • WESTBORO, MASSACHUSETTS, U.S.A.

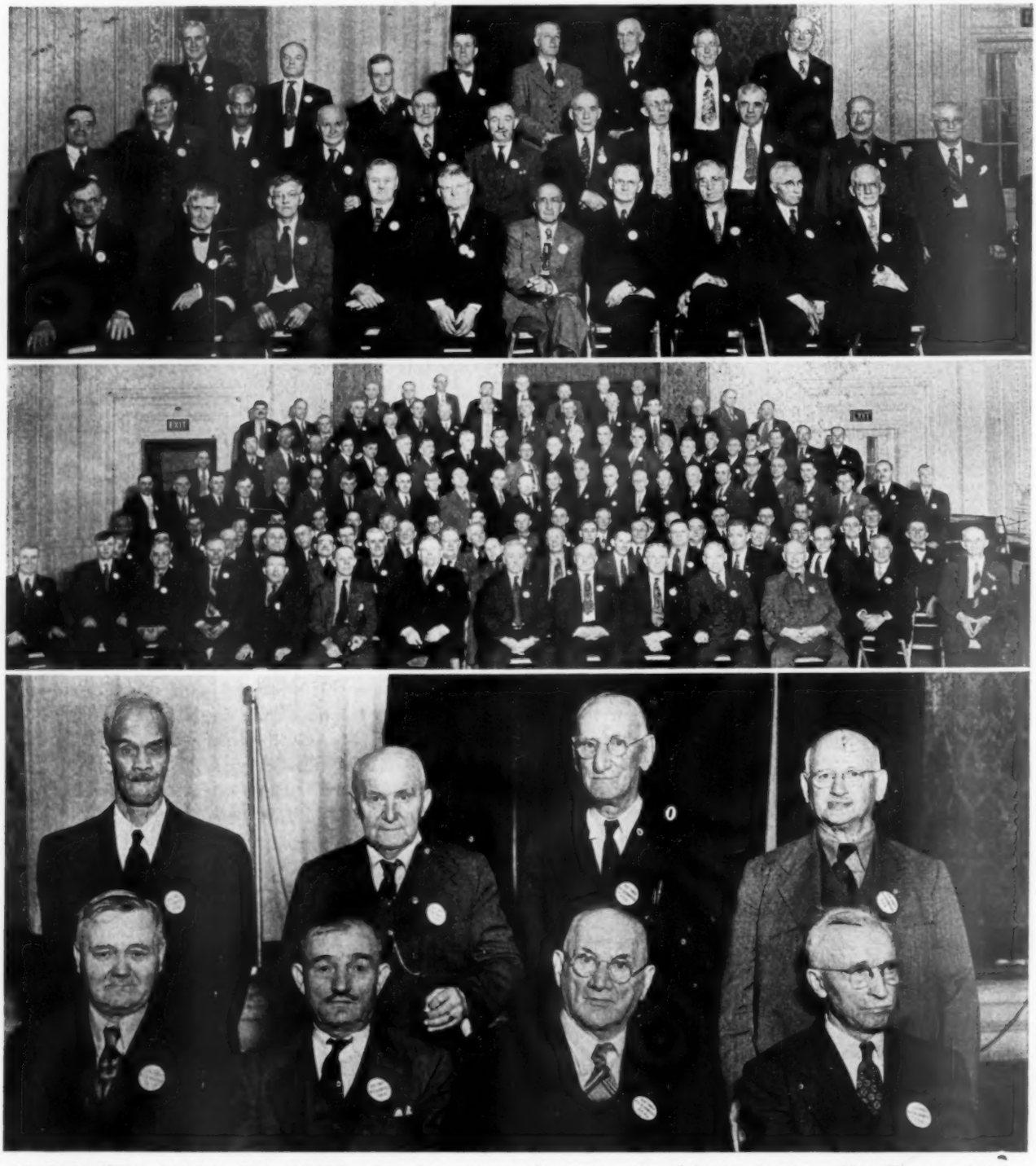
(*Continued from page* 150)

Corriveau, Montreal Technical School. Steel Molding, E. Power, Canadian Car & Foundry Co. Ltd.

At the recent AFA congress, apprentice contest entries from the Eastern Canada and Newfoundland Chapter took five out of the twelve available awards. The first prize winner in each class had been awarded a trip to the congress. C. Corriveau, Montreal Technical School, winner in the nonferrous molding division, and R. Dragon, Western Pattern Works, winner in the patternmaking division, won this distinction from the local chapter, and were present at the congress.

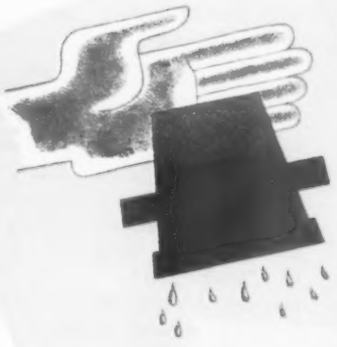
Officers elected at the meeting to serve the chapter during the 1946-47 season include: Chairman, Henry Lou-

(*Continued on page* 154)



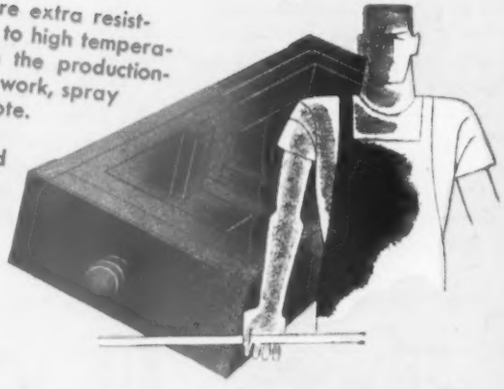
NORTHEASTERN OHIO'S OLD TIMERS: Foundry veterans who were guests of the Northeastern Ohio Chapter, AFA, at the recent Old Timers' Night. Center panel shows the approximately 130 men with service records of 40 or more years. In the top panel is the 50-year group. At the bottom is a group including 60-year veterans. Left to right, lower row, they are: John Kownacki and Paul Zvolenic, Fulton Foundry & Machine Co.; Jack Horning, Ohio Foundry Co.; Gus Zimmerman, Eberhard Mfg. Co. Upper row—Sam Seay, Forest City Foundries Co.; Charles Moraveck, National Malleable & Steel Castings Co.; Benjamin D. Fuller, Whitehead Bros.; Barney Birnbaum, American Crucible Co.

3 foundry blackings to meet your needs



cordip For dipping or spraying dry or green sand cores on light production work—it pays to use Cordip. Simple to prepare, easy to use, Cordip comes in powdered form complete with binder. Add water and apply— 20° Beaume for spraying, 35° Beaume for dipping. Will not build up or run on core surfaces. Holds true core dimensions and penetrates sand to prevent burning in.

mexacote Where extra resistance to high temperature metal is demanded in the production-casting of light and medium work, spray molds and cores with Mexacote. Quickly mixed with water to paste consistency, then thinned for spraying. Mexacote forms a firm coating that will not crack, shrink, scab, peel, or buckle under heat, can be dried by torch or lamp.



No. 172 blacking A high quality wet blacking for cores and dry sand molds, No. 172 Mexican Blacking is easily and smoothly applied with swab, brush, or spray. Turns the hottest iron and allows sand to peel cleanly, making it ideal for medium, extra large, and pressure castings weighing 1 to 25 tons. Ready mixed with bond, requires only water.

THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICHIGAN

(*Continued from page* 152)

ette, Warden King Ltd., Montreal; vice chairman, A. E. Cartwright, Canadian Foundry Supplies & Equipment Ltd., Montreal; secretary, R. E. Cameron, Webster & Sons Ltd., Montreal; treasurer, L. Guilmette, Canadian Foundry Supplies & Equipment Ltd. The following were elected as directors for three years: C. C. Brisebois; W. L. Bond, Ottawa Car & Aircraft Ltd., Ottawa; John Shewan, Canadian Car & Foundry Co., Montreal.

Following introduction of the incoming chairman, two interesting films on die casting, and refining and casting of magnesium, were shown.—*G. D. Turnbull, publicity chairman.*

New England

REGULAR monthly meeting of the New England Foundrymen's Association was held June 12, at the Engineers' Club, Boston. Preceding the meeting a dinner was served to the 120 members and guests present. W. Byron Hagerman, association president, presented Roy T. Wise, consulting engineer, New York, the speaker of the evening, whose subject was "Dielectric Baking of Sand Cores."

Mr. Wise's extensive knowledge of the foundry industry was brought out in his excellent handling of the subject. He described a method which he has developed for baking sand cores, using a water-soluble, thermo-setting, plastic core binder. The equipment consists of a dielectric generator and oven, with a conveyor belt running through the drying tunnel. It is compact and easily operated. The core binder used is water soluble and allows the core to bake with little or no gas or fumes given off. The equipment can be set up on a molding floor, to bring the cores to the location where they are to be used.

The short time required for baking reduces the amount of core oven equipment ordinarily required, in addition to furnishing more cores in a given period of time. For instance, the speaker described one core which was baked in 30 seconds by this method, which required one hour by the conventional method.

Among several other advantages, Mr. Wise explained that although the cores are thoroughly baked, the coreboxes, plates, etc., do not get hot. Further, little or no heat is transferred to the surrounding room or floor. Cores made by this method are of good collapsibility and high tensile strength. Over-baking does not occur, which lessens the hazard of drying cores with thin sections. Non-metallic core boxes and plates must be used. Plastics may be employed for this purpose. The smaller of the two sizes of this equipment bakes 150 lb of sand per hour and the larger unit handles 400 lb per hour.

Mr. Wise illustrated his talk with some fine lantern slides, after which the meeting was thrown open for discussion.

Annual outing of the association will be held Aug. 14. Next regular meeting is scheduled for Sept. 11.—*Merton A. Hosmer.*

Birmingham

BIRMINGHAM District Chapter of the AFA concluded a most successful fiscal year at its May meeting when over 100 members and guests gathered for the monthly dinner and technical session. Chairman J. Arthur Woody gave a review of the activties and accomplishments of the chapter during the year and credited James A. Bowers, program chairman, as having much to do with the fine showing made. Abe Holberg, chairman of the membership committee, was also praised, as well as his assistants, George F. Vann, co-chairman, M. L. Carl, Donald C. Abbott, L. L. Stone, M. E. Manuel, John F. Wakeland and J. Arthur Hill.

The technical session was a continuation of the subject discussed by E. H. King and J. S. Schumacher, Hill & Griffith Co., Cincinnati, at the March meeting, on "Mechanization in the Foundry." James A. Bowers acted as master of ceremonies in a panel discussion on "Operation and Maintenance of Mechanized Foundries," which was led by Morris Hawkins and L. L. Stone, Stockham Pipe Fittings Co., and W. J. Moore and J. L. Irwin, American Cast Iron Pipe Co. The following points were emphasized: Periodic examination and inspection of equipment, with written reports covering recommendations; replacement of cables before estimated life span expires, preventing breakdowns and delays; use of proper oils and grease by an experienced and qualified lubrication man to prevent costly re-

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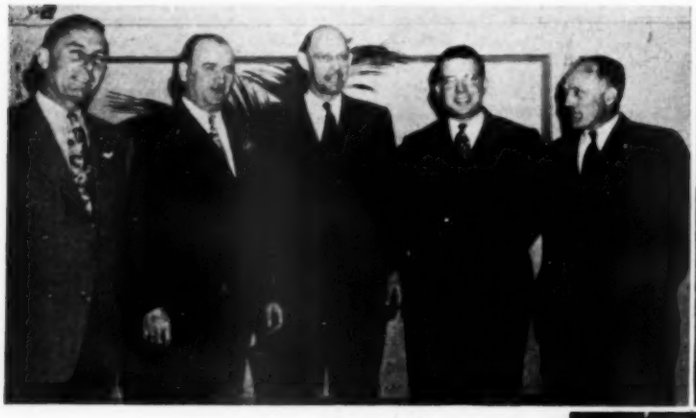
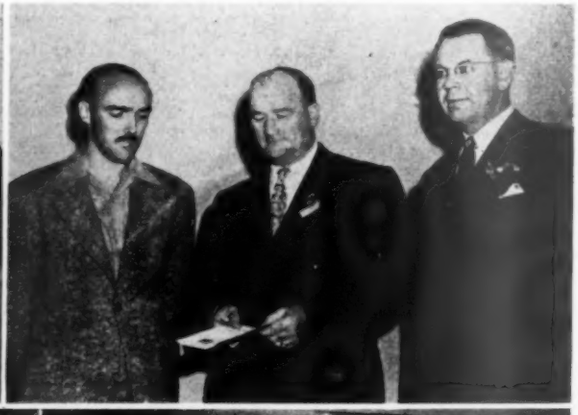
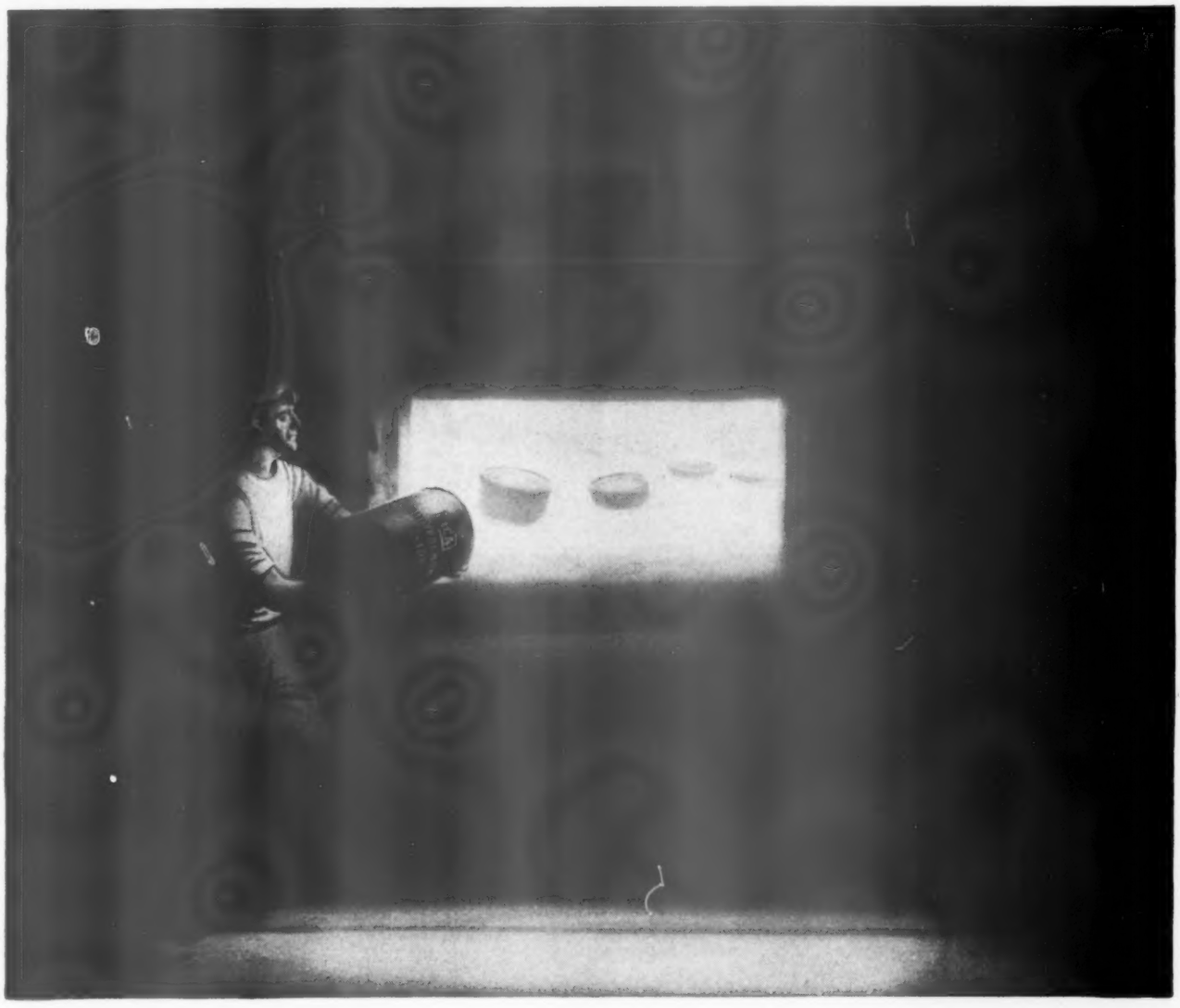




SOUTHERN CALIFORNIA: Annual election of officers of Southern California Chapter, AFA, was held at the May 24 meeting, shown in part here. Shown left above are: Earl Shomaker; Robert R. Haley, Advance Aluminum & Brass Co.; retiring president; William D. Emmett; Henry Russill and Leonard Hoffstetter. At right above are: E. R. Mertz, University of Southern California, meeting speaker; Robert R. Haley, and Ralph A. Lewis, Los Angeles Steel Casting Co., speaker. General view of the meeting at Rodger Young Auditorium, Los Angeles, is shown at right.



. . . INTO METAL IN 12 MINUTES

MCA Molybdenum Oxide in convenient metal cans is easily added, either with the charge or later after the charge is melted. It may be used in an electric furnace, open hearth, air furnace or cupola. Use of metal containers gives superior protection against dampness, ease of handling, and better all-round convenience. High concentration of molybdenum is economical in transportation and storage. The steel container, which is not coated with tin or any other harmful material, is dissolved in the molten metal with its contents. Full recovery of the molybdenum, when added to liquid steel baths by this method, may be expected in about 12 minutes. This is the fastest recovery obtainable except by use of ferro-molybdenum or metallic molybdenum. MCA, as a large supplier of Molybdenum, Tungsten, and other alloying materials, is glad to be consulted by any user of such products.

MASTER CRAFT ALLOYS

AMERICAN Production, American Distribution, American Control, Completely Integrated.

Offices: Pittsburgh, New York, Chicago, Cleveland, Detroit, Los Angeles, San Francisco, Seattle.

Sales Representatives: Edgar L. Fink, Detroit; H. C. Donaldson & Co., Los Angeles, San Francisco, Seattle.

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MOLYBDENUM CORPORATION OF AMERICA

GRANT BUILDING PITTSBURGH, PA.

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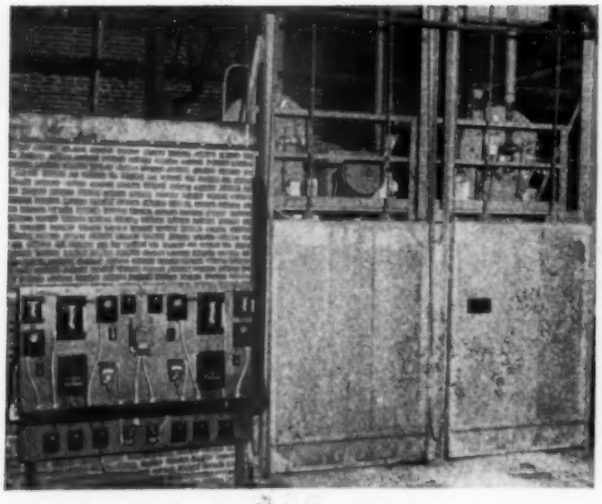


Two Recirculating Oil Fired Double Rack Type Core Ovens with Lift Doors, as installed for The Crucible Steel Castings Co., Lansdowne, Pa.

CARL-MAYER OVENS

The Choice for DESIGN, PERFORMANCE

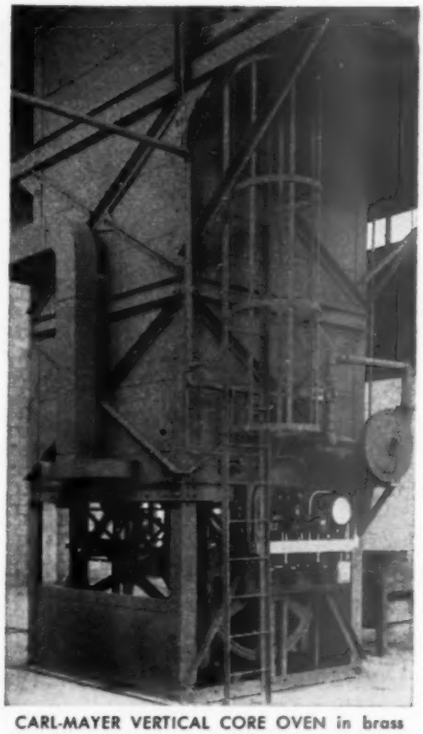
FOUNDRY owners and engineers are quick to recognize the value of outstanding engineering features available in Carl-Mayer oven design.

This is proven by the fact that leading concerns like those listed below, order Carl-Mayer Ovens repeatedly in face of wide foundry oven competition.

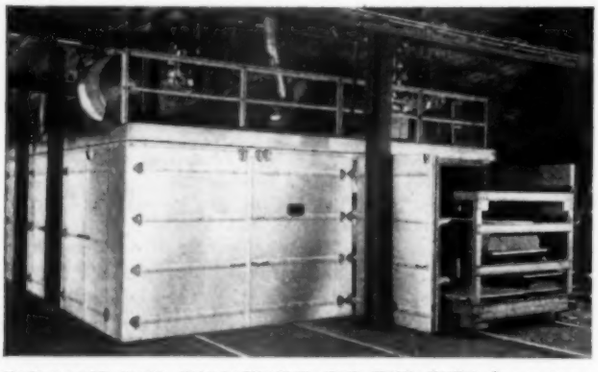
CORE AND MOLD OVENS—All Types, Sizes

A FEW CARL-MAYER CUSTOMERS—

Aluminum Co. of America
American Radiator Co.
Brown Industries
Bucyrus-Erie Co.
Crucible Steel Castings Co.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
General Electric Co.
General Motors Corp. and Subsidiaries
Gilbert & Barker Co.
General Steel Castings Co.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
H. B. Salter Co.
Shenango Penn Mold Co.
Studebaker Corp.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.



CARL-MAYER VERTICAL CORE OVEN in brass foundry of The H. B. Salter Co., Marysville, Ohio, manufacturers of heating and plumbing fixtures.



CARL-MAYER TWO COMPARTMENT CAR TYPE OVEN for cores and molds. Also has doors on side permitting its use as a rack type oven.

EXPERIENCE—For more than 25 years, Carl-Mayer Oven Engineers have brought forth outstanding developments for fast baking, uniform baking and fuel economy. Therefore, when you choose Carl-Mayer oven equipment you are assured of the best in all around operating efficiency.

Write for Bulletin

THE CARL-MAYER CORPORATION

3030 Euclid Ave., CLEVELAND, OHIO

(*Continued from page* 154)

pairs; a working force, properly trained in the operating care of machines, to effect maintenance savings; and stocking of spare parts most liable to fail in equipment, to prevent shutdowns.

Officers elected to serve during the year 1946-47 include: Chairman, T. H. Benners Jr., Woodward Iron Co.; vice chairman, W. E. Jones; secretary-treasurer, Fred K. Brown, Adams, Rowe & Norman Inc. The following directors were also elected: For three years, J. Arthur Woody; for two years, Tom Bellsnyder, Dan B. Dimick, A. S. Holberg; for one year, J. M. Bates. Previously elected directors who will continue to serve through 1947-48 are: W. Carson Adams, Dr. James T. MacKenzie, John F. Wakeland, C. P. Caldwell, and J. T. Gilbert.—*J. P. McClendon, publicity director.*

Metropolitan

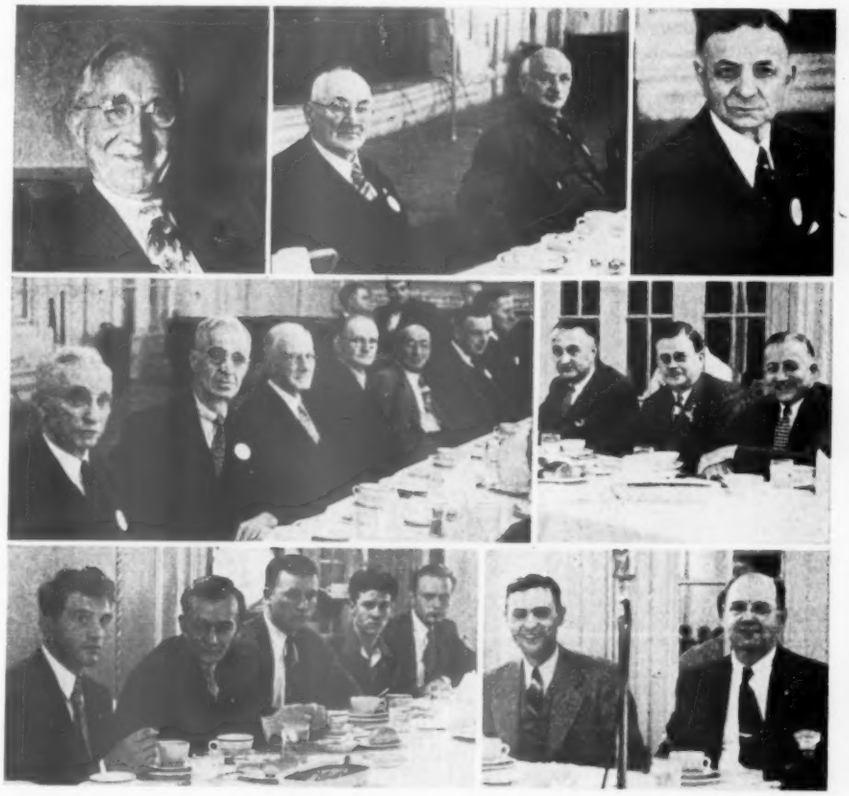
ANNUAL meeting of the Metropolitan Chapter of the AFA was held at the Essex House, Newark, N. J., June 3, with 150 members and guests in attendance. Horace A. Deane, retiring chairman, reported a membership of 375 and well attended meetings during the season, with a gratifying interest in the educational meetings sponsored by the chapter. Among the guests present at the meeting was J. M. Robb, Hickman Williams & Co., Philadelphia, and chairman of the Philadelphia Chapter of the AFA.

Norman J. Dunbeck, vice president, Eastern Clay Products Inc., Eifort, O., was guest speaker. In discussing "Synthetic Foundry Sands," Mr. Dunbeck said that with the abundance of published data on fire clay and bentonites available, the foundryman is in position to make a wise and intelligent choice of bond. By synthetic sands are meant those prepared in the plant by mixing a selected sand with a selected bond for a specific type of work. Foundries having a sand reclaiming system can readily change to synthetic sands, while those which have no reclaiming system have a more difficult problem as an intimate knowledge of sand mixtures, selected bonds, and moisture required, is essential.

Advantages of synthetic sands enumerated by the speaker include lower costs, better control of sand properties, lower moisture content, higher flowability, less trouble in storing winter supply, and higher moistening points. Mr. Dunbeck discussed briefly the features of a new plastic bonded sand which is in an experimental stage of development. Henry Mackler, metallurgist, Singer Mfg. Co., New York, presided as technical chairman during the discussion which followed presentation of the subject.

Officers elected to serve the chapter

TWIN CITY: A few of the participants at monthly meeting of the Twin City Chapter of AFA. Photos courtesy Paul Pufahl & Son Foundry, Minneapolis



Scenes at the season's last meeting of Northeastern Ohio Chapter, AFA, when old timers and apprentices were special guests of the chapter. (Photos by Sterling N. Farmer, Sand Products Corp., Cleveland)

during the year 1946-47 include: Chairman, Harold L. Ullrich, works manager, Sacks-Barlow Foundries Inc., Newark, N. J.; vice chairman, Kenneth DeLong, metallurgist, International Nickel Co., New York; secretary, J. F. Bauer, Hickman Williams & Co., New York; treasurer, D. Ponderman Jr., Whiting Corp., New York. Directors elected to serve two-year terms are: D. Frank O'Connor, American Saw Mill Machinery Co., Hackettstown, N. J.; Arthur L. Fisher, Fisher Castings Co., Plainfield, N. J.; B. E. Beldin, Whitehead Brothers Co., New York; Bernard N. Ames, Brooklyn Navy Yard, Brooklyn, N. Y.; and Philip Van Duyne, Meeker Foundry Co., Newark, N. J. Thomas J. Wood, American Brake Shoe Co., Mahwah, N. J., was named director for one year, to fill unexpired term of Alexander McIntosh.—*C. J. Law.*

Detroit

REFLECTING the 50th anniversary of both the AFA and the automobile industry, the recent annual outing of the Detroit Chapter of the AFA was designated as the Golden Jubilee Foundrymen's Outing, and in all respects it measured up to its special title. Held June 22 at the Forest Lake Country Club, the event attracted a capacity attendence of more than 400 chapter members and guests.

Perfect weather helped to make the affair an outstanding success and lured a large number of its participants to a tour of the golf course. Cards and other indoor sports engaged the others during the day. An excellent chicken dinner preceded the evening program, which consisted of the drawing for more than a hundred door prizes, followed by a nine-act "Super Jubilee Floor Show."

Arrangements for the day were capably handled under the direction of Al Neeb, Eaton Mfg. Co., assisted by Ed Burke, Hanna Furnace Corp.; Bob Orth, American Foundry Equipment Co.; Bill Seese, J. S. McCormick Co.; Art Stolzenburg, Aluminum Co. of America, and Art Allen. THE FOUNDRY.—*William G. Gude.*

Northern California

OLD Timers' and Apprentices' Night attracted 152 members and guests of the Northern California Chapter of the AFA to the May 16 meeting, held at Hotel Alameda, Alameda, Calif. Pete Valentine, Henry Sinigiani and James Muir furnished music which started things off in a fine spirit of fellowship, with Jay Snyder at the piano. Edward LeRoy gave a program of impersonations. Manuel Codero, Phoenix Iron Works, and a 35-year old timer, won Pete Valentine's award of a necktie, with some well rendered songs.

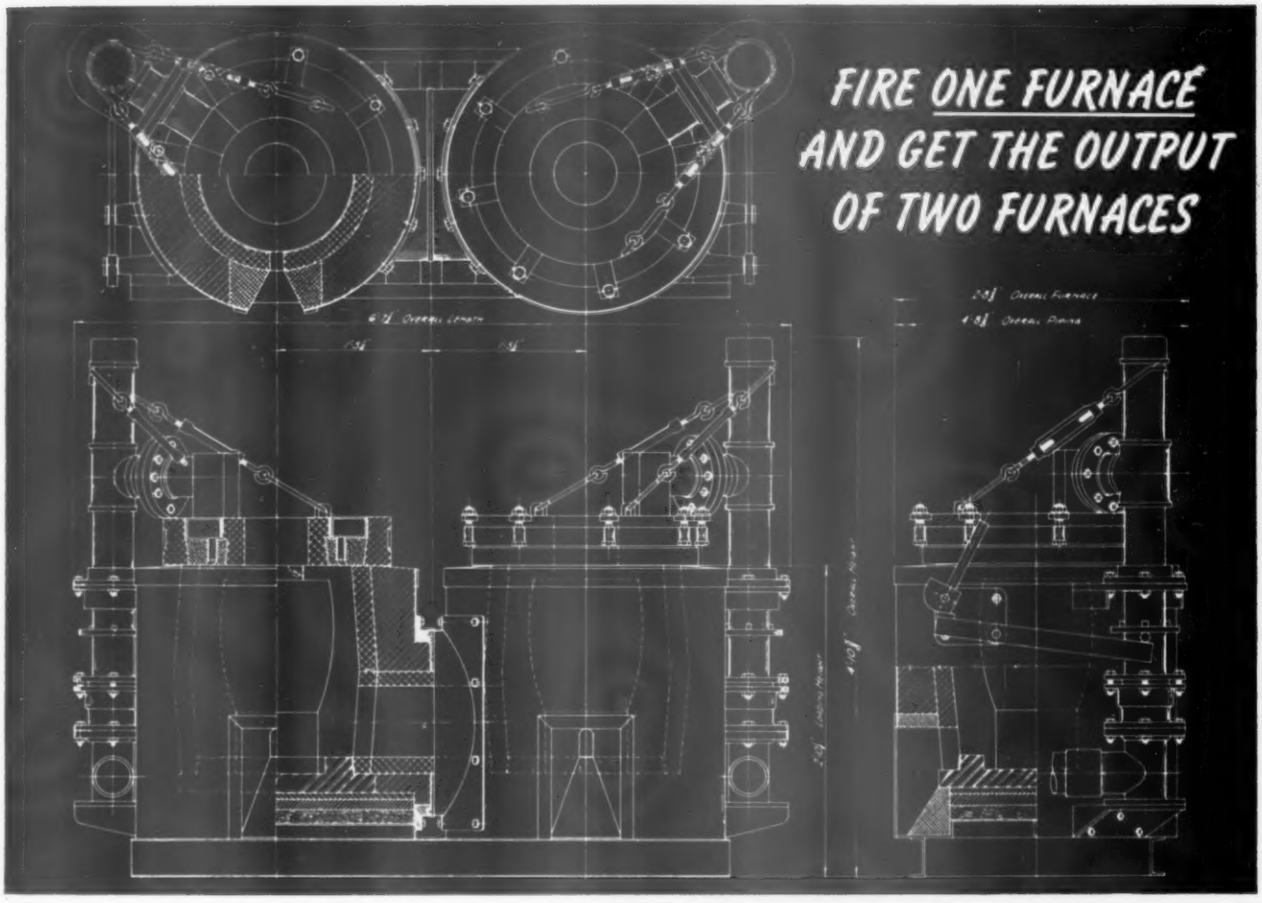
Among many old timers present were: Charles Hoehn Sr., president, Enterprise Engine & Foundry Co., San Francisco, with over 56 years in the industry; Alexander Guild and his brother George, Phoenix Iron Works Co., Oakland, with 52 and 46 years, respectively; Charles Payne, San Francisco Iron Foundry, 46 years; August Souza, Vulcan Steel Foundry, Oakland, 35 years, Les Moseno, Vulcan Steel, 30 years, and John Gonzalves, H. C. Macaulay Foundry Co., Berkeley, 30 years. Charles Hoehn Sr. spoke for the old timers and told many interesting anecdotes of the old days when the foundry industry in the bay area attracted mechanics of all nationalities. Alex Guild praised the work of the AFA and stated it had educated the employer, making the work of the employees easier.

About 25 apprentices were present, many of who were attending their first meeting as apprentice members of the chapter. Joseph Melling, H. C. Macauley Foundry Co., instructor of apprentices at the Oakland Trade School, spoke for the apprentice program and stated that owners of foundries must take more interest in apprentices. He introduced William Hinde, Lynch Brass & Aluminum Foundry, and teacher of apprentices at Berkeley Trade School. Van Lawrence of that school stated that training supervisors should endeavor to make leaders, not drivers. Joseph Monte Verda, molder, Mare Island Navy Yard, described apprentice training there. Two apprentices, William Skinner, Vulcan Iron Foundry, a member of the Oakland class, and M. Gonsalves, H. C. Macaulay Foundry, a member of the Berkeley class, expressed appreciation of the opportunity given to apprentices and agreed that the keynote is harmony and co-operation.

Samuel Russell, a national director of the AFA, reported on the convention of that organization, held in Cleveland May 6-10. Mr. Russell described exhibits and activities and some of the foundries he visited. One foundry, he noted, gives annual physical examination, including x-ray, in the plant, complete in 15 minutes. He mentioned new equipment and

(*Concluded on page* 162)

WISCONSIN: Some of the old timers who attended the annual dinner tendered them by Wisconsin Chapter, AFA. (Photos courtesy John Bing, A. P. Green Fire Brick Co., Milwaukee)



18 Reasons

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10. Lining is easy to replace. (No burner ports)
11. Burners easy to inspect and replace. (Change in 15 minutes)
12. Burners cannot plug. (Burners in top where slag or metal cannot reach them)
13. Pure metal. (Neutral pressure on metal surface allows charcoal or atmosphere to be used)
14. Furnace can be flued through the floor to the outside, eliminating heat and gases in foundry.
15. No leakage of cover. (No flame through or around cover)
16. Quiet operation.
17. Unobstructed flueing. (Flued at bottom and charge does not affect it)
18. Metal is visible at all times and temperature can be taken at any time, without shutting off burners.

This fuel-saving, faster-heating Radiant furnace saves you money . . . *pays for itself the first 6 months* . . . because it has *two* crucibles, loaded at all times, and fired alternately, the second crucible is preheated by the flue gases from the heating of the first crucible. While the metal from the first crucible is poured, a third crucible replaces the removed one to receive cold metal. Each side is fired alternately, as the covers are cam lifted and swung backward independent of one another.

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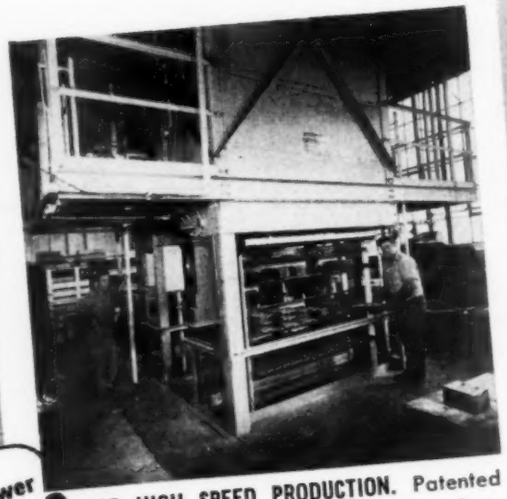

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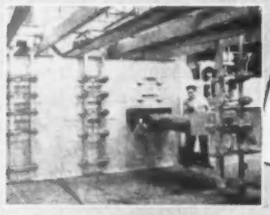
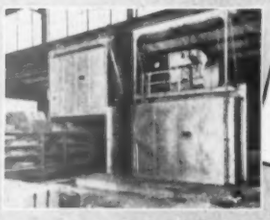
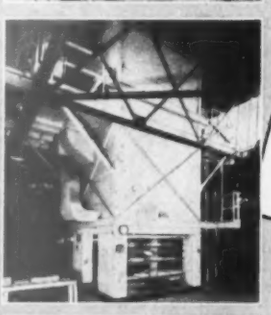


COLEMAN Rolling Drawer Ovens

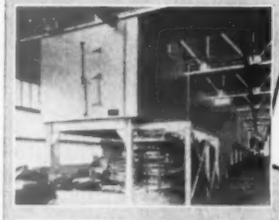
COLEMAN Transrack Ovens



COLEMAN Car Type Ovens

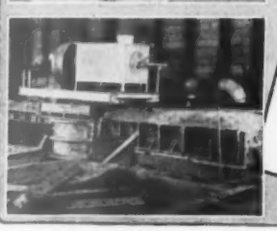


COLEMAN Tower Ovens



COLEMAN Horizontal Conveyor Ovens

COLEMAN Conveyor Mold Ovens



COLEMAN Portable Mold Dryers

EQUIPMENT *Company*

OHIO, U. S. A.

MEMBER

AND SWARTWOUT OVENS

(*Concluded from page* 158)

supplies shown at the congress, mentioning specifically rapid baking of cores by dielectric heating.

Charles Hoehn Jr., chapter president, called upon Samuel Russell, chairman of the nominating committee, who announced the selection of candidates to serve as officers and directors of the chapter for the year 1946-47. The following names were presented: President, Richard Vosbrink, Berkeley Pattern Works; vice president, Andrew Ondreyco, Vulcan Iron Foundry Co.; secretary, Fred Aicher, E. A. Wilcox Co.; co-secretary, Charles Marshall; treasurer, Jack Benedict. Directors elected for two-year terms include: Harris Donaldson, William Clark, Fred Williams, and Leon Cameto. Allen Axford and Norman Barnett were elected to fill unexpired terms of Ralph Noah and Gus Penning. — *Charles R. Marshall, publicity chairman.*

New Jersey

NEW Jersey Foundrymen's Association held its second annual outing at the Crestmont Golf Club, West Orange, N. J., June 20, with 175 present. Golf, quoits and a soft ball game between the foundrymen and the foundry supply men were among the diversions. Various prizes were distributed at a dinner in the evening, which was also featured by a floor show.

Gerald W. Hannay, Barnett Foundry & Machine Co., Irvington, N. J., was chairman of the outing committee. M. J. Hogan, Bierman-Everett Foundry Co., Irvington, N. J., is president of the association.—*Ben K. Price*

Central New York

ANNUAL meeting of the Central New York Chapter of the AFA was held June 14, in Syracuse and was attended by 150 members and guests. Activities began with a visit to the Crouse-Hinds Co., Syracuse, where guests toured its modern foundry which is mechanized from core department to cleaning room. High points of interest were the battery of coreblowing machines and conveyor oven in the core department; mechanical cupola charging, balanced blast cupolas, mold, sand and casting conveyors in the ferrous foundry; and the water type cleaning barrels and conveyor systems in the cleaning and grinding departments.

As the various groups completed their trips through the plant, they were directed to Hinerwadel's Grove, where the afternoon's activities were completed with sporting events and a clambake.

Following the dinner, the following chapter officers were elected for the 1946-47 season: Chairman, E. E. Hook, Dayton Oil Co., Syracuse; vice chairman, R. A. Minnear, Ingersoll-Rand Co., Painted Post; secretary, C. M. Fletcher; treasurer, M. H. Hollenbeck, Kennedy Valve Mfg. Co., Elmira. E. G. White, 1945-46 chapter chairman, William G. Parker and D. J. Mervin were named directors for three years, N. Paul Benson and Arthur C. Hintz for two years and J. F. Livingston, N. H. Boardman and David Dudgeon for one year.—*John Feola, reporter.*

SAGINAW VALLEY: Scenes at the annual business meeting of Saginaw Valley Chapter, AFA. Top row, left to right, includes: John F. Smith, Chevrolet Gray Iron Foundry, new chapter chairman; Morris Bean, Morris Bean Co., Yellow Springs, O., speaker; William G. Mixer, Buick Motor Division; Francis C. Brewster, Dow Chemical Co., new secretary-treasurer

Malleable Founders Elect Officers

At the recent annual meeting of the Malleable Founders' Society Frank E. Shumann, president, Lehigh Foundries Inc., Easton, Pa., was elected president for the coming year. H. S. Colby was re-elected executive vice president, while John J. Harant was chosen secertary-treasurer to succeed Robert E. Belt, who retired as of July 1 after 30 years of continuous service to the society and its predecessor organizations.

In recognition of Mr. Belt's long service the society tendered a dinner in his honor during the annual meeting and presented him with a watch and an inscribed resolution of appreciation of his efforts in behalf of the industry during the past 30 years.

Issues Bulletins For Foremen

National Foremen's Institute Inc., Deep River, Conn., has published a booklet entitled "How To Keep Ahead Of Your Job," which provides a step-by-step illustrated plan for foremen and supervisors to follow in developing improvements in methods of department operation so that workers can produce greater quantities of products in less time by making better use of manpower, machines and materials available. The booklet, which covers important aspects of supervisory training, is priced at 25 cents. Another bulletin issued by the institute describes the work of the organization, its purpose, and the people who carry on its activities. Entitled, "National Foremen's Institute, What It Is and How It Works," it is available upon request to the firm without charge.

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Moreover, his intimate knowledge of the problems dealing with ferro alloys, pig iron, fluorspar, coal, coke, shot and grit enables him to give you far more than just ordinary service.

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ELIMINATION OF CASTING DEFECTS

(*Continued from page* 78)

under these conditions, while perhaps grudgingly acceptable to the buyer, are an inevitable source of dissatisfaction, and in most cases incur increased machining costs. However, where patterns and coreboxes leave nothing to be desired in accuracy of dimensions, but where faulty flask equipment is used, a myriad of troubles result. Misalignment of cope to drag is generally described in a rather vague manner as a shift. This does not begin to describe defects resulting directly from such misalignment. Blows, crushes, sand and slag inclusions, cold shuts and run-outs are the inevitable accomplices of imperfect matching of cope and drag.

Figs. 1 through 5 clearly illustrate advantages obtained through provision by management of the best possible flasks and pattern equipment within practical limits, for a large quantity of heavy and difficult Meehanite castings requiring exactitude of dimensions, finish and physical properties.

Increase Cylinder Production

Early in 1941, it became apparent that if the total number of Liberty ships our government so urgently required were to be delivered on schedule, the production of cylinders for the triple-expansion, reciprocating steam engines which powered these ships, would have to be increased enormously. Up to that time, conventional methods of casting cylinders of this type and size had discouraged the use of flasks.

Universal foundry opinion deemed as impractical any possibility of obtaining dense, uniform and clean bores, unless castings were poured with the bore in a vertical position. This involved in most cases the use of pits, draw-backs, ponderous outside cores, and a vast amount of labor and floor space. Maintenance of pattern equipment to dimensional standards for large production runs was virtually impossible under such conditions.

Facing a schedule which demanded a quick build-up to 15 units per week, this schedule to be indefinitely sustained, the management of the foundry which undertook this task decided that a new fundamental approach was necessary. The logical answer was to mold and cast these cylinders from split pattern equipment with bores on a horizontal plane, whereby most of the external contours would be formed in the mold and a minimum of sand and flask area required. It was realized that such pro-

(*Continued on page* 166)

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LUMP 50% FeSi

for "blocking" heats

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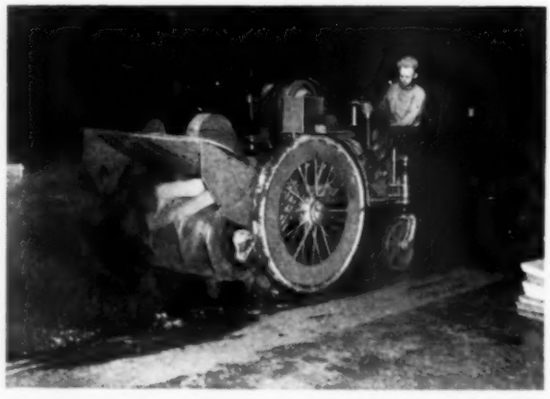
ALL these defects can be caused by poor sand conditioning -

1 Scabs
2 Blows
3 Drops
4 Blisters
5 Pin Holes
6 Rough Surfaces
7 Dirt Inclusions
8 Cuts and Washes

The quality of castings turned out in your foundry depends to a great extent upon the quality of the molding sand. To help avoid the defects listed above, condition your sand with an American Sandcutter. Check these advantages:

1. Every foot of sand cut with a Sandcutter is sliced at least 150 times, whereas hand shoveling at best results in only 6 cuts per cubic foot.
2. Because sand is thoroughly tempered, common molding faults are largely overcome. Uniformity of sand makes uniform castings.
3. Sand can be prepared in accordance with individual requirements for moisture, bond and permeability.
4. Dry spots, wet spots, lumps and pockets of new sand cannot escape the churning, blending action of the cutting blades.
5. In piling, the Sandcutter gives the sand additional cuttings due to extra forward and backward motions of cutting cylinder through the heap.

Sand conditioned by a Sandcutter results in better castings, reduced scrap losses and increased production. A Sandcutter will save time, money and labor, too ... other important reasons why you should investigate it. There's a Sandcutter to meet your needs. Write for literature.



American Sandcutter
FOUNDRY EQUIPMENT CO.
505 S. BYRKIT STREET, MISHAWAKA, INDIANA

(*Continued from page* 164)

duction would demand not only the stoutest of pattern and flask equipment but that all flask sections be interchangeable. Accordingly, patterns were constructed from mahogany lumber and metal-faced on all flanges and other vulnerable projections. Cope and drag halves were then permanently secured to heavy cast pattern plates. All coreboxes were metal-faced and constructed for maximum productivity. Cope and drag pattern plates were face-machined, as were all flask joints, and four pin-holes were drilled through plates and all flasks, these bushed with hardened steel standard bushings to insure perfect alignment of sections.

Fig. 3, shows the drag half of the high pressure cylinder pattern with all gates attached. Note plate size and bushed pin-holes. All cylinders were poured from two ladles as can be readily seen from this picture. Pouring was timed in all cases from stop watch so as to permit the foot to completely fill before the main runner system, shown at lower left, began to function.

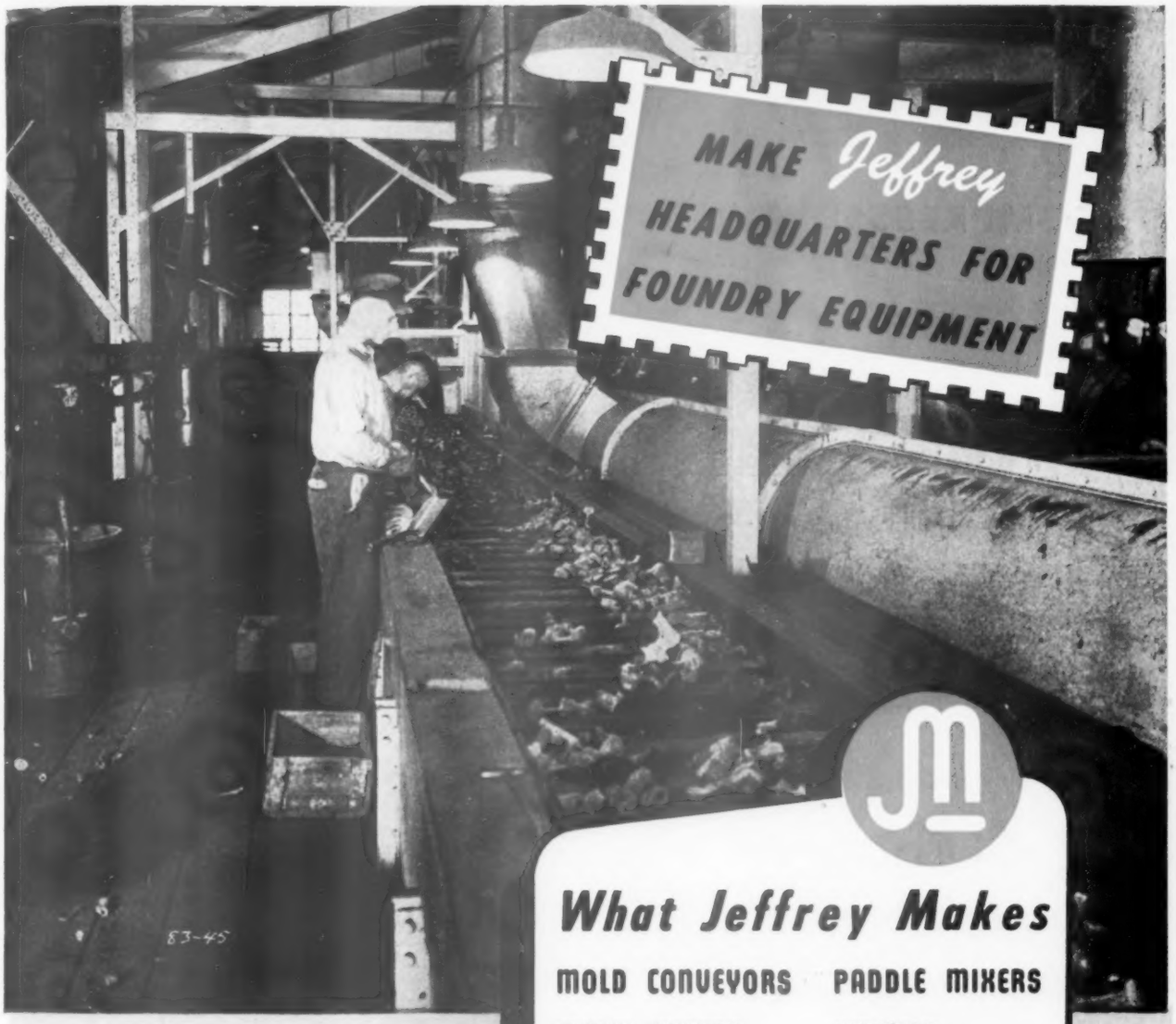
Gates for Maximum Efficiency

Fig. 2, shows the same half pattern from the foot side. Note the four steamer plugs in the center of the pattern which were used to accelerate drying of deep pockets and to insure removal of all steam. Standard tapered plug cores were inserted in these openings before core assembly. Note also design of gates, whereby quiet progressive and uniform pouring was obtained. Properly proportioned traps, as shown at lower right, precluded any possibility of slag or dirt entering the mold.

Fig. 1, shows the drag half pattern for the medium pressure cylinder. The same fundamental system of gating was again used, as can be noted. To insure quiet and uniform filling of both feet this type was poured from two ladles in three stages. All sprues were plugged in both runner boxes. Pouring was started in the small runner and the sprue plugs removed from the deep side of the large runner box at a short interval after the first ladle began pouring. Following a second interval to insure filling of both feet, plugs were pulled on the shallow side of the large runner-box and pouring completed with all gates functioning. It can be readily seen that these gating systems insured a minimum of turbulence within the mold and eliminated the possibility of bore defects from erosion or inclusions. Note again dimensional ratios of the gating system.

Fig. 5 shows complete core assembly of a medium pressure cylinder made from pattern equipment shown in Fig. 1. Note flask construction, machined

(*Continued on page* 168)



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Sorting Castings
Directly from Shakeout

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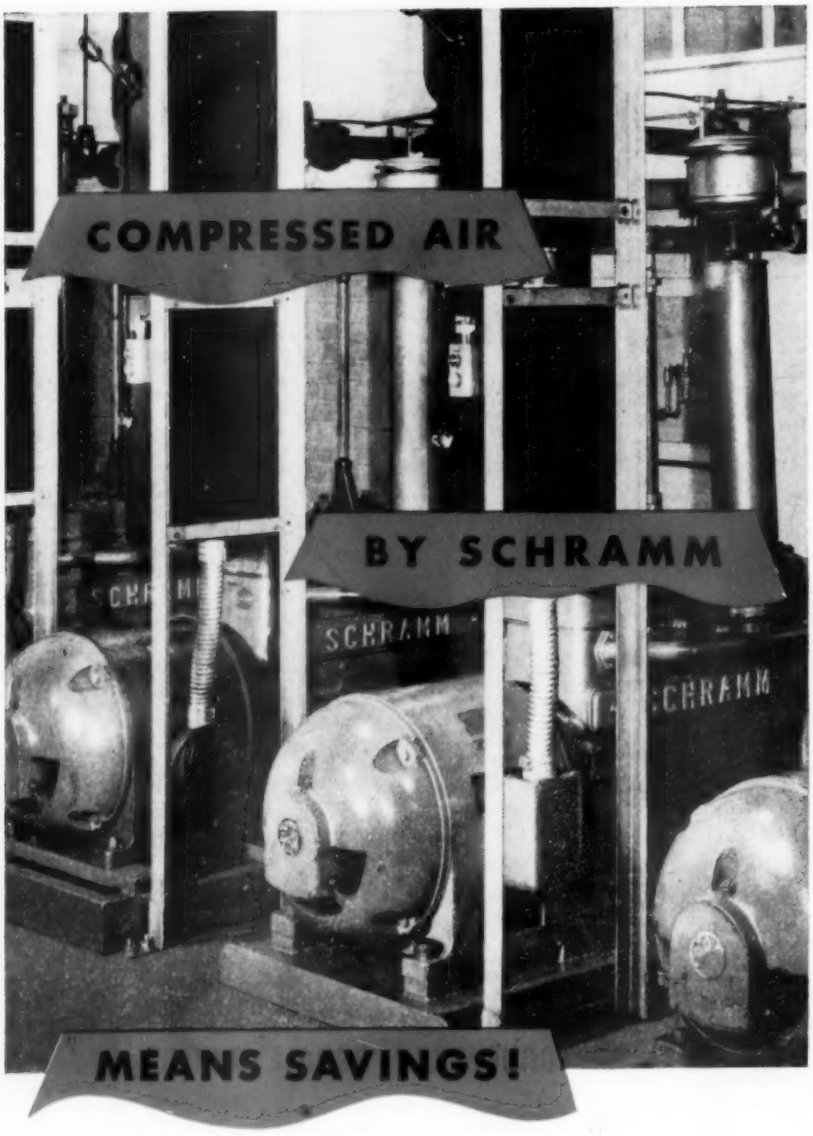

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PENNSYLVANIA

(*Continued from page* 166)

joint and bushed pin-holes. Note also that no vents were taken from the joint or vertical core surfaces. Top vents permit sure and easy sealing and direct upward ejection of gases. Core drying was also greatly aided by the same type steamer arrangement as used in the molds. Plugged steamer holes can be seen on the barrel or bore core and also on the side of the saddle core.

Fig. 4 shows the Meehanite cylinder preparatory to shipment. Note size of fin line through center of bore flange and adjacent projections. Maintenance of required machining tolerances in these bores would not have been possible without the type of flask and pattern equipment described.

This program was completed during the summer of 1944 and a summary provided the following facts and figures.

A total of 1998 cylinders were cast, representing 32 per cent of all the cylinders required for the entire Liberty ship program during the war. Total daily melt was 33 tons. Total shipping weight was 16,000 tons. Average yield was 73 per cent.

Total rejections included 14 castings—8 of these were foundry defectives and 6 returned after partial machining. There were no back charges for remachining. Total scrap was seven-tenths of one per cent.

Flask First on List

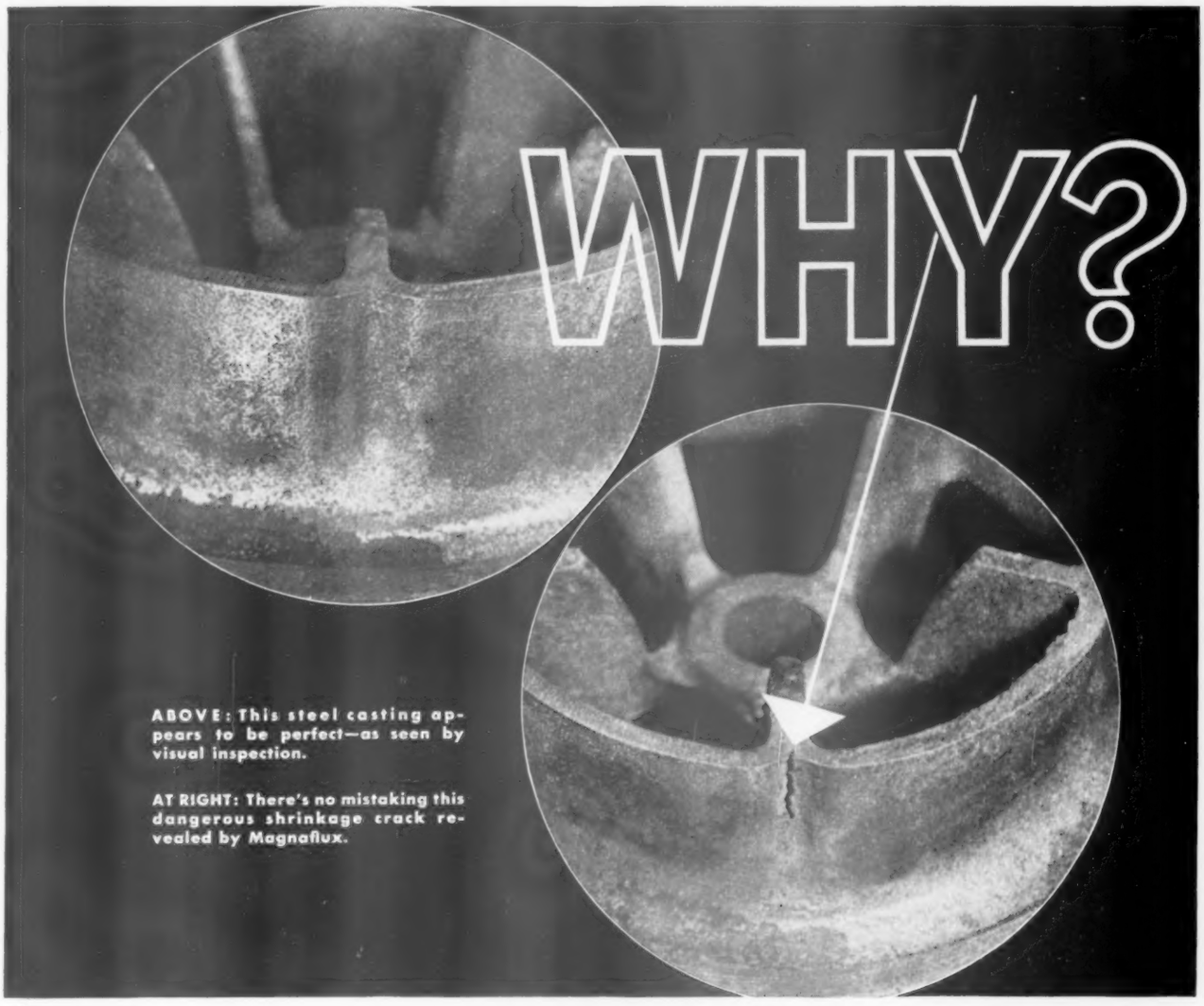
Obviously, the success of this program can be attributed to two things—good equipment and good metal. Needless to say, pattern plates and flasks used for the cylinder program have been and are being used to produce a large variety of heavy castings, and this equipment will continue to make high quality castings for many years to come.

It is, therefore, imperative in considering working materials, that flask equipment should be first on the list. Adoption of fixed standards for flask construction, pin sizes and pin-hole tolerances, and interchangeability of flask sections of any given size are within the means of all foundries, regardless of the type or nature of the castings produced, or the number and variety of patterns involved.

Where such standards exist, it is doubly important that management establish strict policies on flask maintenance, and devise the best possible means of shakeout, handling and storage. A quick appraisal of flask conditions in any foundry will definitely establish the calibre of its management.

It has been stated by some analysts that 75 per cent of all foundry defects are directly or indirectly attributable to

(*Concluded on page* 170)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ABOVE: This steel casting appears to be perfect—as seen by visual inspection.
AT RIGHT: There's no mistaking this dangerous shrinkage crack revealed by Magnaflux.

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Modern quality control in the foundry does not stop at culling out defective castings. It looks into every instance—seeks to trace and eliminate the causes for sub-standard production. More and more foundries use Magnaflux because it can detect *hidden flaws* continuously—non-destructively.

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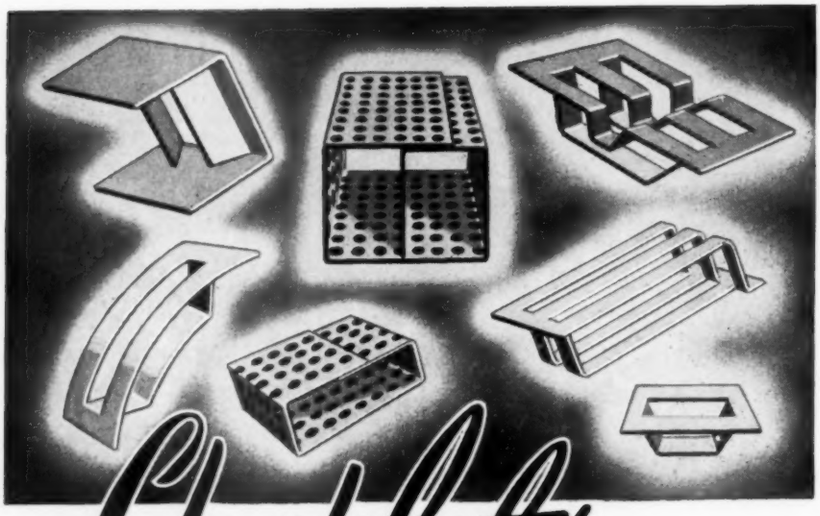

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(*Concluded from page* 168)

inadequacy of sands. This is a broad statement, but when fully considered it is perhaps rather accurate. Rapid progress has been achieved in establishing basic fundamentals of good sand control for all foundries, regardless of geographic location, diversity of castings and metals produced. It is appallingly pathetic that a vast number of foundries have made no effort to install even the most rudimentary equipment for sand control. More appalling still is the fact that many foundries, equipped with the most elaborate sand laboratories, have failed to train capable technicians, and use their facilities in a limited or haphazard manner, or permit such facilities to remain completely idle.

Consequently, it can be easily understood why such vast differences exist in the quality of castings produced by several foundries to the same specifications, and theoretically under the same conditions. This again directly reflects calibre of management.

Standardize Melting Practice

By the same token, failure by management to provide firm and progressive policies in regard to the use of scrap of certified analysis, and to maintain melting facilities in first-class condition, precludes any possibility of producing castings of uniformly good quality, and of holding to a minimum, defectives incurred through poor melting practices.

Third: *Supervision*—It is also management's responsibility and concern to provide education and supervision of men in correct techniques, and methods of working. The product of any industry is only as good as the personnel involved in its production. This statement again points directly at management. The most successful foundries—and this does not necessarily mean large foundries—have achieved their positions primarily through the building of technically trained supervisory personnel, and through provision and encouragement of trade training to the working force.

(*To be concluded next issue*)

Gray Iron Founders To Meet Oct. 22-23

Gray Iron Founders' Society will hold its annual meeting at the Netherland Plaza Hotel, Cincinnati, Oct. 22-23, it has been announced by W. W. Coutts, executive vice president. The program of papers and discussions to be presented is being prepared with the view to treating industry problems relating to management methods, government regulations, materials and production techniques.

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Bronze, iron, and steel turnings, tightly enmeshed in bulk scrap, presented a real recovery problem in a large eastern plant until two Dings Type DA Magnetic Separators were put to work handling the heavy daily volume of recoverable material

Plant requirements demanded no more than 0.1% iron present in recovered non-magnetic turnings. The mixture entered the Dings Type DA Separators uncrushed and contained up to 40% iron and steel turnings mixed with the bronze. As shown in the accompanying diagram, Dings Type DA Separators provide double magnetic separation by means of two powerful magnetic pulleys: one above, and the other below the belt carrying the material to be separated. An agitating feeder helps to disentangle the turnings, which are then efficiently and automatically separated by the magnetic pulleys.

If you have a difficult separation problem, bring it to Dings. There is no obligation to you for Dings Engineering service and complete recommendations.

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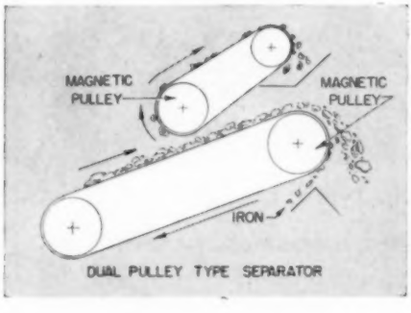
"Separation Headquarters Since 1899"



DUAL PULLEY TYPE SEPARATOR

SAND RECLAMATION FOR FERROUS FOUNDRIES

(*Continued from page* 89)

during this mulling operating by pulling air with a vacuum of about 1 oz per sq in. through the muller. Fine clays and fine sand particles will be removed. These fines can again be separated and fine sand recovered for re-use as blending sand. Coarse, or sand that stayed in muller, is sent to foundry for reuse as dry sand ready for mixing with oil and the making of cores.

Another possibility in the separation and removal of the fines from the dry scrubbed sand is to separate them in a dry classifier after, and independent of, the mulling operation. In this case no vacuum would be applied to the muller; it would merely be used as a physical scrubber.

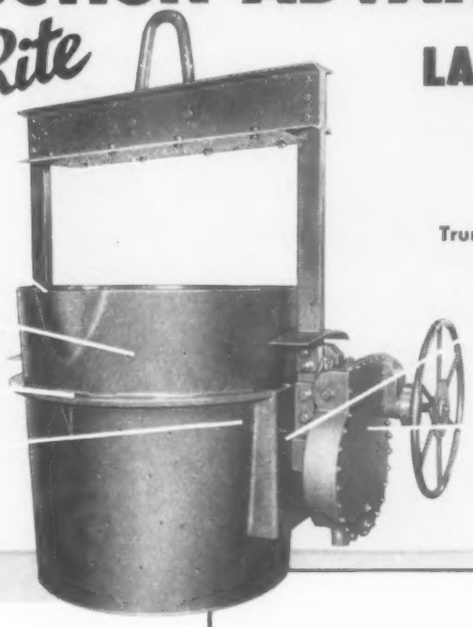
Use Wet Shakeout

Many foundries making large castings, in which there is a large percentage of internal cores, have adopted the wet shakeout method. By this method internal cores are broken up and removed from castings by a high pressure stream of water and sand. It seems logical that these people would then decide to reclaim this sand by a wet method as it is already wet at their shakeout. That this method of reclamation has proved satisfactory for these foundries cannot be disputed. It has not been conclusively proved, however, that this same method of wet reclamation would be satisfactory for a foundry making smaller castings with many intricately shaped and thin section cores. The foundry making castings with the smaller cores does not employ "wet shakeout" methods. For instance, the foundry making automotive cylinder blocks removes the spent internal core sand by dry methods. Castings are vibrated vigorously and dry air is used to blow out loose sand. The outside and accessible inside portions of blocks are shot blast, but this blast does not reach into the water jacket and other inner sections of the casting.

The nature of the core sand mix for these intricate and light cores is such that the core must collapse and disintegrate into loose flowing sand particles so that complete removal from castings is assured. When first made, these cores of light sections have to be strong enough to withstand rather rough production handling. Cores are handled many times as they are pasted together into various assemblies and finally assembled into molds for casting. During casting this

(*Continued on page* 174)

CONSTRUCTION ADVANTAGES OF Pour-Rite LADLES



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Welded Bowls of Extra Heavy Steel Plate

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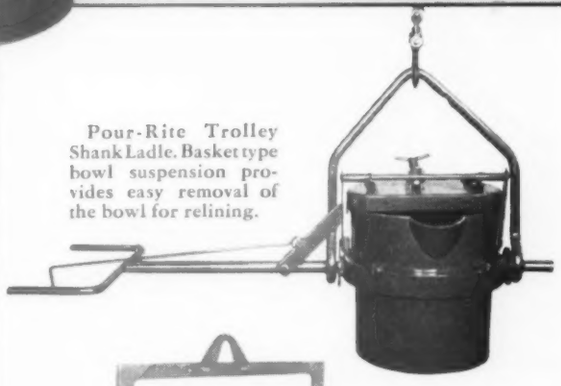
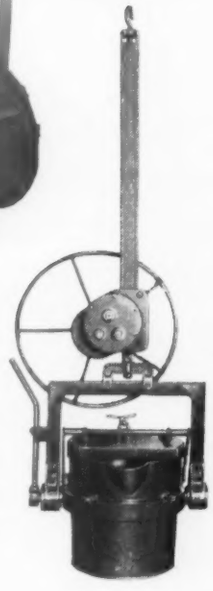
The Pour-Rite crane ladle is shown above. Other Pour-Rite models include trolley shank ladles, covered ladles, etc., with gearing or hand tilt, V-bail or square bail, taper side and cylindrical in sizes from 12 inches up. Write for information and prices. Whiting Corporation, 15607 Lathrop Avenue, Harvey, Illinois.



Pour-Rite Trolley Shank Ladle. Basket type bowl suspension provides easy removal of the bowl for relining.



Pour-Rite Cylindrical Pouring Ladle . . . available in vertical hand lever tilt, as well as gear bracket tilt (as shown).

Pour-Rite Taper Side Ladle, with Pour-Rite Ladle Handler for faster operation and accurate pouring.

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Manufacturers want the most efficient, most economical handling equipment they can buy. Now more than ever this equipment must fit their particular handling requirements. Shepard Niles Hoists handle loads up to their full rated capacity with a minimum of maintenance cost—giving long durable service.

SHEPARD NILES CRANES are advanced in performance and in every detail of construction—a real contribution to efficient load-handling. They are designed and constructed to sustain high efficiency throughout a long, rugged life. Engineered construction gives dependable, smooth operation at low cost.

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To assist you in selecting such a competitive advantage as economical load-handling, Shepard Niles offers you the use of its engineering facilities and staff—without obligation.

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(*Continued from page* 172)

core must withstand metal erosion, penetration and all other conditions a small core completely surrounded by metal encounters.

Large chunk-like cores do not have to have the strength of section that the much handled small core must have, and because they are accessible to means of removal after casting, they do not require the properties of complete collapsibility. Clays and strengthening agents may be added in large enough quantities to the large cores for green strength and for dry strength. Because most of these clays impart to some extent the property of poor collapsibility, they cannot be added in as great a quantity to the small cores, which virtually have to remove themselves from the intricate recesses after the casting operation.

Many cores are being made for which the foundryman considers new sand as not being any too good. These types of cores are numerous in automotive parts and related foundries. Reclamation by any method must produce a sand that will approach closely the properties the foundryman already has attained with new sand. Will such a method, satisfactory for certain cores and foundry conditions, be satisfactory for all foundry conditions?

Reclaim Core Sand

It has been concluded that a core sand to be properly reclaimed must have the spent oil or other binder removed; it must have the "clinging clay" dislocated and removed, and it must have the loose fines removed.

The wet method depends on the physical scrubbing of the sand grains on one another to loosen and dislocate the spent oil and clinging clays. Can it be assured that sand used over and over again will not accumulate some spent oil and carbonaceous matter together with sintered clay because the smaller grains and some of the recesses in the grains were not vigorously scrubbed? The dry method, in which burning of the oil and carbonaceous matter is done, certainly would assure that this material would be completely removed each time sand went through the reclamation system. The clay that is sintered to grain particles would have to depend on dry scrubbing for removal, but the amount of material to be dislocated by scrubbing would be less.

The classification of the sand and removal of the dislocated and already loose clay can certainly be done well from a quality standpoint by the wet method. It is hardly possible that any dry method of classification or separation

(*Continued on page* 176)

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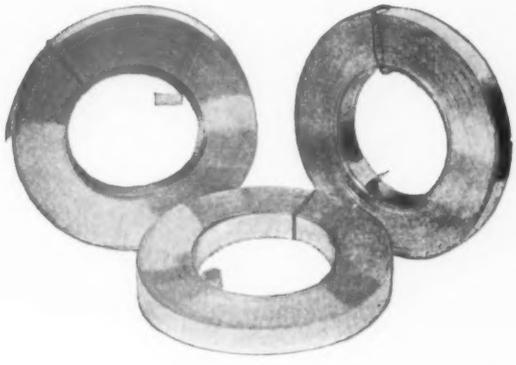

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Weight Roll in lbs.	1 3/4	1 7/8	3	4	4 1/2	5	7	7 1/2	9
Number of feet in roll	112	100	160	145	115	105	95	80	80
Price per lb.	$0.43	.41	.40	.39	.36	.36	.35	.35	.35

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(*Continued from page* 174)

can approach the wet method for quality and completeness of this separation. This classification has been accomplished successfully on a small scale by pulling off fines with vacuum during dry scrubbing in muller and also by separation after scrubbing in an independent unit. However, no production experience is back of these methods.

In the wet method of reclamation, the sand will be handled wet during the entire reclamation procedure until it is dried just before delivery back to foundry. To the foundry with the wet shakeout this probably appeals; to the foundry with dry shakeout it means that it must wet its already dry sand and then re-dry it for use. The idea of wetting and re-drying already dry sand will not appeal to some foundries from a fundamental standpoint.

The dust problem, of course, is all in favor of the wet system. Engineers have a real problem of handling the dust for the dry method. Dust will be actually manufactured during the separation process if muller scrubbing and separation is used. This dirt, which is the dislocated and loose clay, must be collected and a cleaned air that was used for this separation be discharged. If the separation is done by other means after only scrubbing in the muller, the large volume of air and dust would not have to be handled. In either case, the incidental dust would have to be properly handled. This type dust problem naturally is present where any large amount of dry, dirty material is handled.

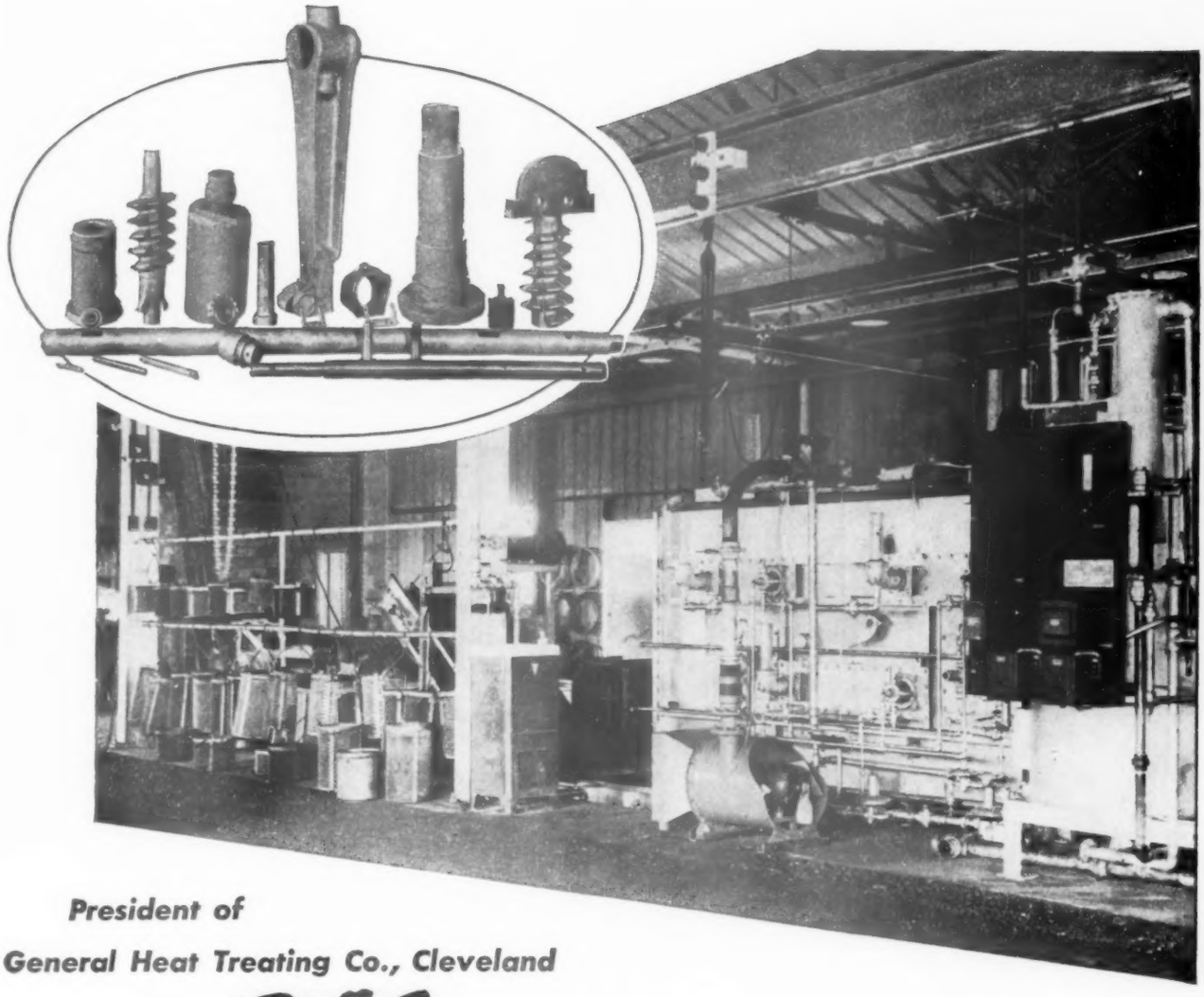
Separator Is Successful

A Raymond separator has been considered and tried for the classification operation after dry scrubbing in muller. The results indicate that it will be successful. The separation, or classification, here is done in a self contained unit in which a turbulence of the air is created by the action of the separator, and no actual volume of air is used; thus no volume of air is discharged.

Clay from these separation processes and from the dust collection system can be disposed of by discarding as a dry waste. There is also a possibility that there might be a use for this material as a blending or bonding agent.

As already mentioned, the wet method does not have this dust problem. However, there is a problem of the large amount of wet fine clay that accumulates in the settling tank. A small foundry might dump clay laden water in a stream. A large foundry in or near a big city could not do this without eventually clogging up such a stream. Foundries located near or in cities do not generally have dump space to pump refuse water

(*Concluded on page* 178)



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(*Continued from page* 176)

and clay. If the clay is allowed to settle out completely and then be removed as mud, it will freeze in the winter. For this reason, it probably becomes necessary to employ some means of drying this sludge, or clay refuse, to a point where it doesn't freeze.

Figures perhaps indicate that the wet reclamation system is somewhat cheaper to install and cheaper to operate than the thermal and dry scrubbing process. It is the writer's opinion that it is almost impossible to make an estimation on operating costs between the two methods, as there are no complete dry methods in operation on which to base concrete figures. Rather than get into a controversy over this, suffice it to say that either method in all probability would prove economical for the foundry that has distance to bring sand into its plant and any difficulty in disposing of spent sand.

In considering reclamation of sand it seems only logical and fundamental that reclamation should be done in foundries of any considerable size. It matters not by what method this reclamation is accomplished, as long as it is the one best suited for that particular foundry's requirements. Most of our materials used in the foundry, except those such as coke and other materials actually consumed, and except the good castings delivered, are reused.

Throw away Good Sand

Core wires are restraightened and reused to considerable extent. Gates and risers are remelted. Green sand is reused over and over with merely a tempering process to rejuvenate it. But dry sand, after only one cycle of casting, is thrown away.

Now that reclamation methods are actually available many foundries are going to reclaim sand. It is most certain to be economical unless a foundry is so fortunate as to have a natural sand pile virtually within its own yards. More quality will be obtained by reclamation because the sand will be delivered from the reclamation unit dry.

Some foundries in the past have used sands that were not as good as other sands because cost of the latter was too higher either due to cost of sand at the pit or to freight. With a reclamation unit in operation, these foundries can perhaps afford to use the more expensive sands with a resultant increase in quality of the castings.

Every one in the foundry industry is now control conscious, as they should be. Reclaiming core sand and delivering it to core rooms in a dry state with a controlled grain classification will go a long way toward accomplishing this foundry control in the corerooms.

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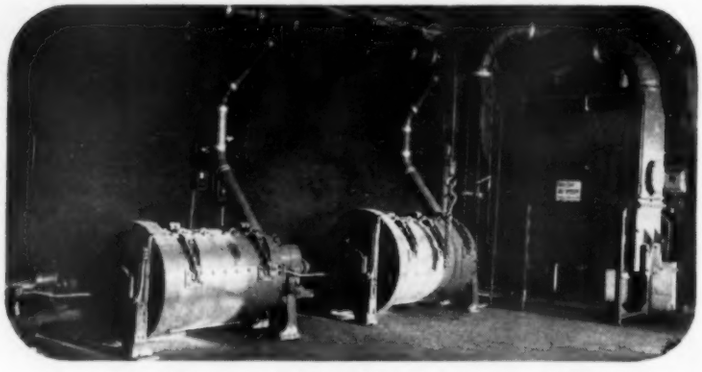

Type R Hydro-Clone handling dust from tumblers.

Whiting Hydro-Clone Equipment
arrests dust at its source . . .

Dust raised by sand conditioners, shakeouts, tumblers, and grinders is fully controlled with Whiting Hydro-Clones. This equipment suppresses dust with water, operating on a new and different principle that eliminates all moving parts except a fan. There are no spray nozzles to clog—no screens or cloth bags to replace.

Dust carried through ducts to the Hydro-Clone is reduced instantly to harmless sludge. From a settling basin the water is recirculated through the Hydro-Clone system, and the sludge may be removed at convenient intervals . . . or removed by a built-in continuous system.

Hydro-Clone Dust Suppression Equipment is in daily use in a great many foundries, where it is giving full satisfaction both for thoroughness of dust control and economy of operation. Send for Bulletin FY-109 for a full description of Whiting Hydro-Clone Equipment.

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(*see left*)

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Whiting Tumbling Barrels have all latest improvements—balanced construction, roller bearings, positive door lock, etc. Bulletin FY-123.

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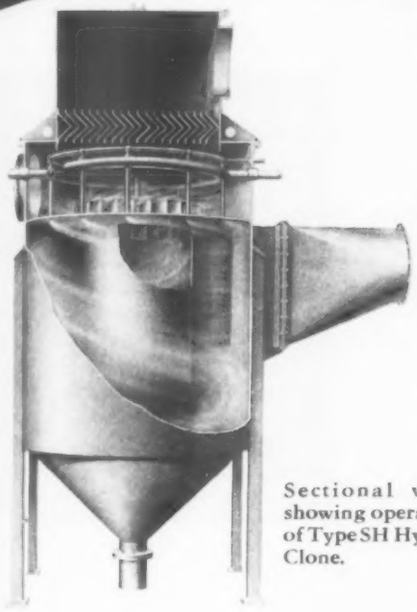

Sectional view showing operation of Type SH Hydro-Clone.

Whiting Hydro-Clone Equipment
for suppressing foundry dust

This equipment gives complete, positive suppression of harmful foundry dusts and fumes by thoroughly wetting the air which carries them. Instead of waterfalls or "cascades," Hydro-Clone employs the high velocity impingement of dust particles on copiously wetted vanes, baffles, and surfaces.

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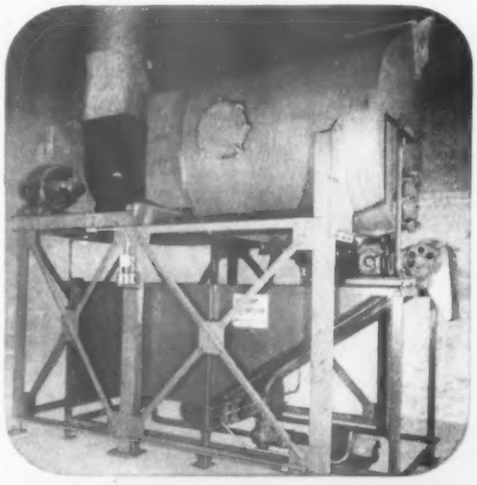

Type SHH Hydro-Clone is recommended for locations with low head room.

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Whiting Hydro-Clones are offered in various styles suitable for the many types of dust problems encountered in foundry operation. If you will indicate the exact nature of your dust suppression needs, we will gladly send appropriate descriptive literature of the Hydro-Clone you need.

Bulletins describing the various items of Whiting Foundry Equipment are available on request . . . fill out the coupon now.

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New, streamlined, postwar Bradley Washfountains in glistening white enamel and sparkling stainless steel are now ready for your washrooms.

With all the features of cleanliness and economy of space and water that have made Bradley Washfountains *the standard* of group-washing facilities—these enameled iron and stainless steel models (not produced during the war) offer still more to washroom appearance and efficiency.

The 54-inch models accommodate 8 to 10 persons simultaneously—cut piping, reduce maintenance—and provide the utmost in sanitary washing facilities.

New Bulletin M566 gives complete details. Write for a copy. BRADLEY WASHFOUNTAIN CO., 2217 West Michigan Street, Milwaukee 1, Wis.

The stainless steel models curtailed during the war are particularly desired in food, beverage, candy, baking and pharmaceutical plants.

BRADLEY *washfountains*

JOB EVALUATION IN THE FOUNDRY

(*Continued from page* 95)

with a dilemma. What about the union? Will the union play ball? The blunt answer is "yes"—if handled correctly. Although unions in the past have been generally opposed to job evaluation, they have nevertheless *not* been the major stumbling blocks to the proper installation of balanced wage structures.

In fact, during the war unions proved themselves the loudest tub-thumpers for scientifically-set pay scales, because under such set-ups the WLB permitted increases —small ones to be sure, but increases nonetheless.

More lately, unions have attacked the subject of wage inequities—the glaring weakness in many industries. Thus, job evaluation today is even more timely in that it would be an effective counter-argument to the charge of wage inequities. As such, job evaluation would probably receive the endorsement of the rank-and-file union—although it may have to be negotiated over the bargaining table.

The best safeguard against arousing the suspicion and resentment of union and employees toward job evaluation is to convince them that the evaluation will be, above all, objective and fair. Point out that, although some jobs may be down-graded, the long-run picture will reflect higher overall wages and more security for the worker.

Consider Workers' Complaints

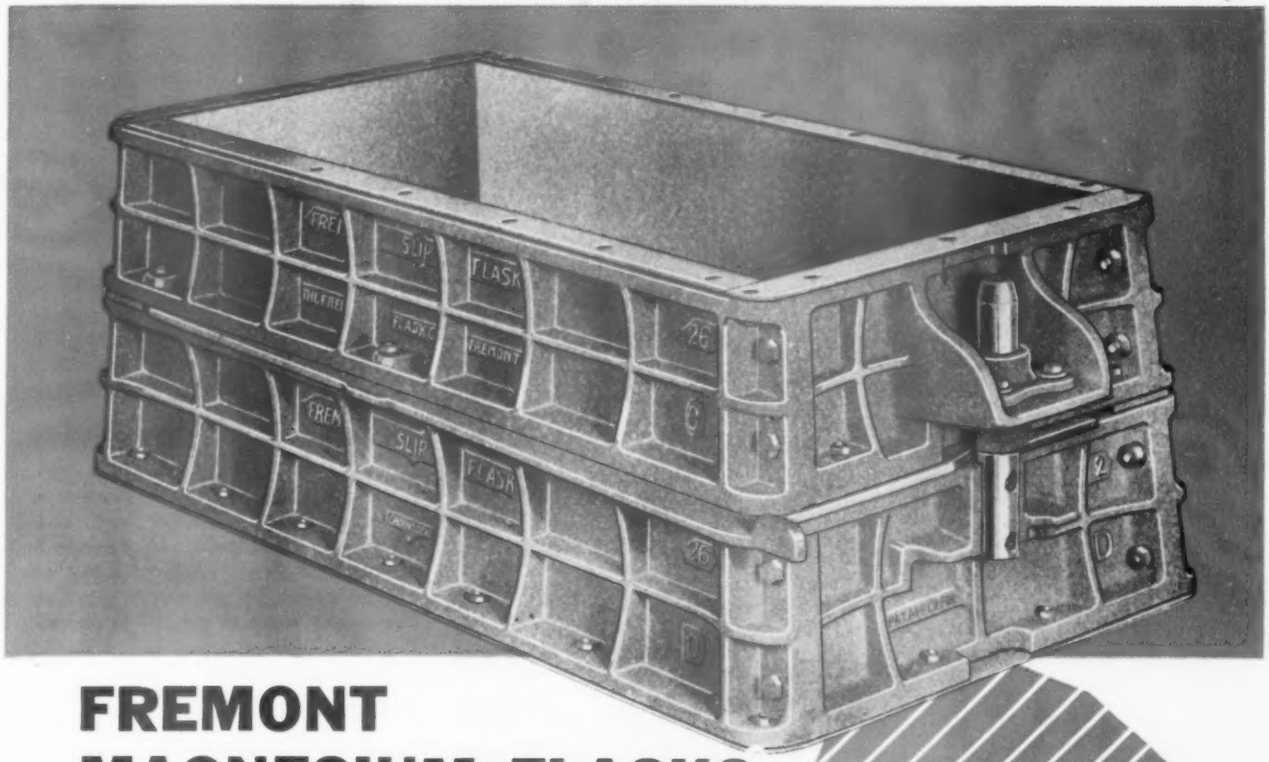
And as a further evidence of good faith, the employer should be sure to explain that any worker complaint over the results of evaluation would be later considered as a grievance to be handled through the regular grievance machinery.

Most practical way of assuring worker co-operation and understanding of job evaluation is to establish a worker's committee. This goes for union and non-union plants. In selecting such a worker's committee, management would be wise to suggest that the more experienced employes who have been with the firm for a reasonable period of employment should make up the committee. These would be more familiar with policies and operations and would appreciate the problems involved.

Primary object of this committee would be to meet with the engineer and management, check the findings on each job, and either approve them *in toto* or suggest changes in terms of special worker understanding of what the jobs demand. The committee should not be given the veto power over the engineer's evaluation.

A job evaluation should be tailor made. It is well to give good warning at this

(*Continued on page* 184)



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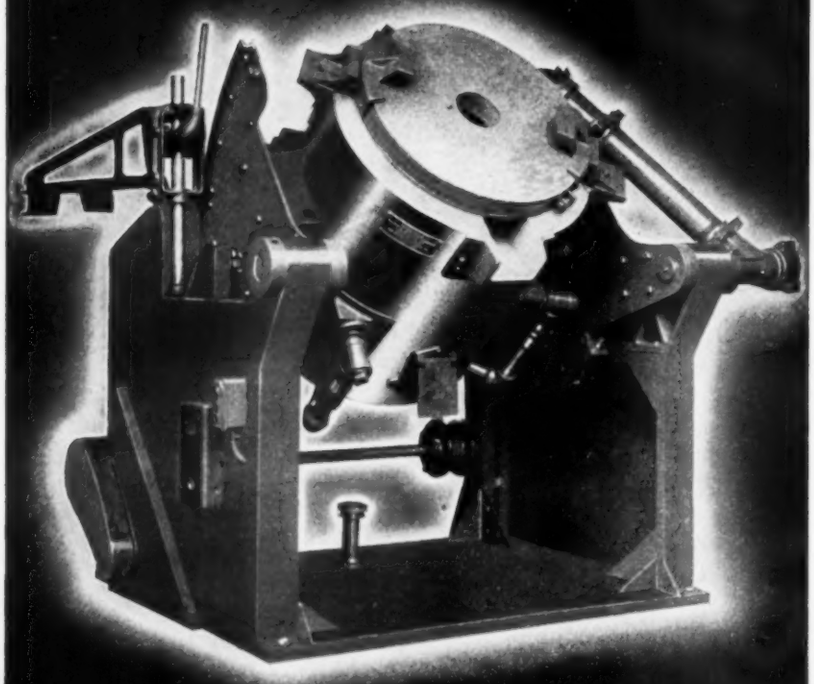

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NON-FERROUS ALLOYS

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

(*Continued from page* 182)

point. One foundry executive got this far along in his thinking and decided to put in his own job evaluation by taking the best features of several plans installed in other foundries. Too late he discovered his error when workers laid a buzzing hornet's-nest of complaints, charges and counter-charges on his doorstep.

While it is true that job evaluation methods have been more or less standardized up to a close approximation, there is no overall plan that can be adopted in two shakes by every foundry in existence. Caution Number One is to remember that *job evaluation must be molded to fit* your foundry, not the reverse.

Caution Number Two: Halfway measures are worse than none. In any job evaluation, each job and operation must be scrutinized, checked and double-checked *individually,* and separate findings must be dove-tailed for the whole organization by the expert. Booklets on ten easy ways to put job evaluation to work can do no more than indicate certain generalities. But it is well for management to acquaint itself with basic pointers on how job evaluation will knock out the uneven spots in its wage structure.

Sets Value on Each Job

Job evaluation defined is nothing more or less than a precise description of job requirements. It sets a value on each and every job in the foundry. It works on the well-tested theory of "rate the job alone—rule out the worker." Obviously, some jobs are worth more than others to an employer in terms of skill, experience, physical and mental effort, responsibility and other factors known to the specialist whose business it is.

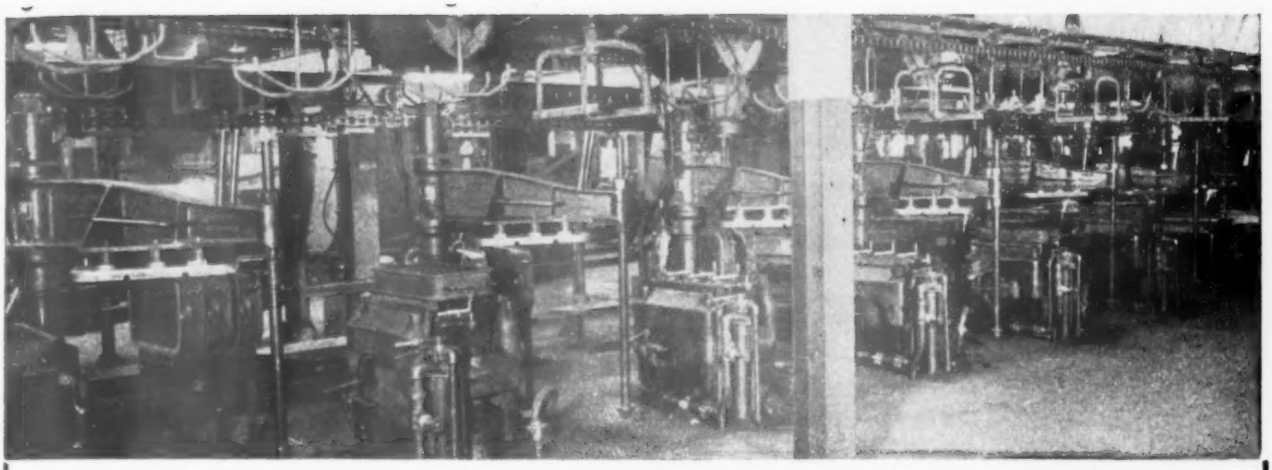
At all times, the employee is paid according to what he does in any given foundry, not on what he knows from another job. For example, a coremaker's job can differ widely from foundry to foundry. One job may require assembling cores of more than one part, while another may be standardized to one part. It is obvious that the first job should be rated higher than the second. Factors such as this are what is meant by having a job evaluation cut to order for a specific foundry.

In his work, the engineer looks into the WHAT, WHY and HOW of each job. He wants to know these things.

WHAT the job requires the worker to do:

1. What tasks make up the job?
2. How often are these tasks performed by the worker on the job?
3. Are all these tasks performed by every employee designated by the same job title?
4. What is the relative difficulty of each task as compared with the others required

(*Continued on page* 186)

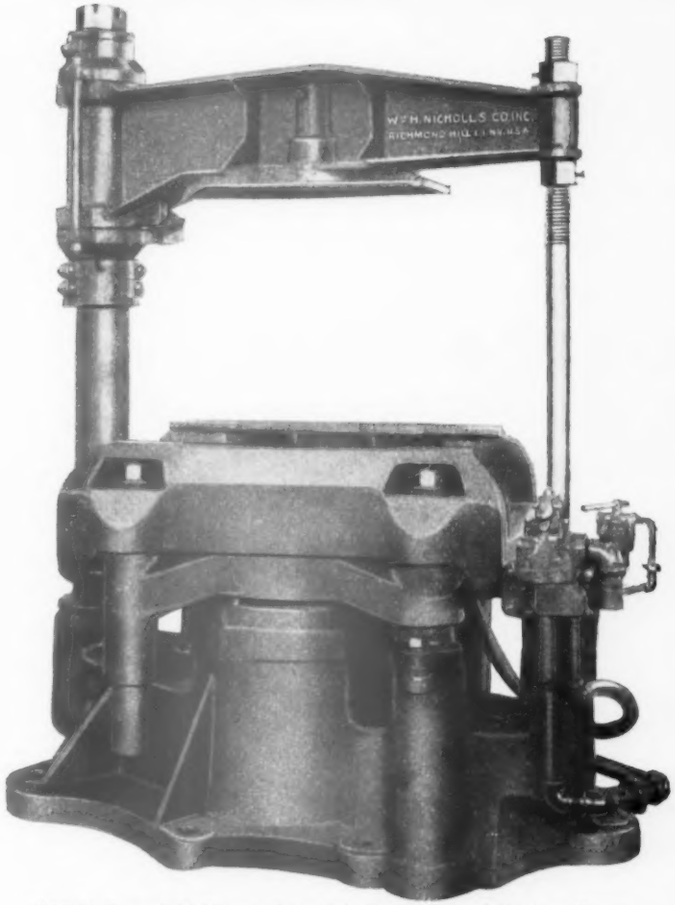


A Battery of Nicholls 16" Heavy Duty Machines

Nicholls' Molding Machines

Preferred by the Largest Foundries . . .

REDESIGNED to a minimum of working parts; thereby greatly reducing maintenance cost and, at the same time lowering operating costs through the saving of labor. The crossarm is equipped with a parallel squeeze plate which considerably reduces the amount of crossarm travel; resulting in faster operation and less effort required. The open end frame allows for flexibility in pattern lengths. Quick acting, yet so simple to operate that unskilled labor can be taught to make molds in record time.



#18-44 Type "K" Heavy Duty Jolt Squeeze and Pattern Draw Molding Machine, with open end frame and parallel squeeze plate, 18" diameter squeeze piston and 8" diameter jolt piston.

Wm. H. NICHOLLS Co., Inc.

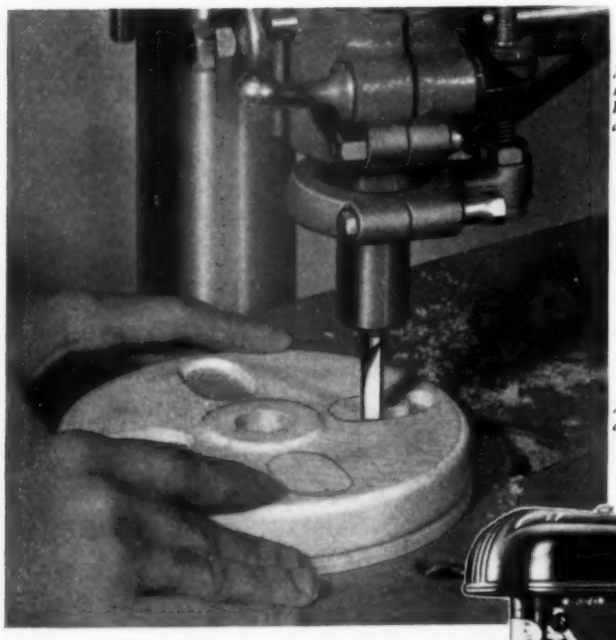
RICHMOND HILL, LONG ISLAND, NEW YORK

ESTABLISHED 1910

Foreign Manufacturers and Selling Agents—

For Continental Europe and Great Britain—The George Fischer Steel and Iron Works, Schaffhausen, Switzerland

NICHOLLS



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Available in both bench and floor types.

On metal and wood patterns . . . and core boxes . . .

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easily, quickly, inexpensively:

- drilling
- tapping
- sanding
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- reaming
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Accuracy, safety, ease of operation, big savings on first cost — these are advantages you enjoy with a Delta 17" Drill Press.

Here's a machine that's a big favorite in pattern shops everywhere. A few of the Delta values responsible for this popularity are: Self-aligning drive and free-floating spindle, for freedom from misalignment troubles. Sturdy quill design and construction. Lubricated-for-life ball bearings.

Get the whole story on the versatile Delta 17" Drill Press from your Delta distributor. He's listed under "Delta-Milwaukee Tools" in the classified section of your telephone directory.

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The Delta Mfg. Division
Milwaukee 1, Wisconsin
Rockwell Manufacturing Company

ROCKWELL DELTA

(*Continued from page* 184)

to get the job done?

HOW the worker has to perform these tasks to do the job efficiently:

1. What tools, materials and equipment are used to accomplish all the tasks required on the job?
2. What precise methods or process are used to accomplish the task?

WHY the worker has to perform each task to get the job done:

1. Why is the job done and what is its overall purpose?
2. Why is each task performed and what is its purpose in each individual case?
3. What is relationship of each task to other tasks and to the total job?

To find out these key facts, the engineer uses what is known as job description. This is broken down into ten specific steps and is usually routine for all foundry operations:

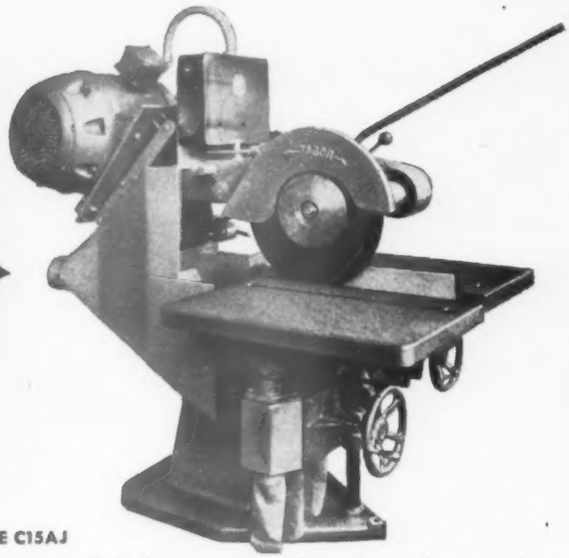
1. Brief description of the nature of the work performed.
2. Detailed description of actual equipment used.
3. Statement of hazards involved in performing the job to the operator as well as to other workers.
4. Discussion of supervisory functions, if any. Direct or indirect supervision clearly distinguished.
5. Description of the value of material handled or processed.
6. Mention of possible damage that may occur to either the material or equipment used.
7. Description and evaluation of skill and dexterity required to accomplish the job efficiently.
8. Follow-up on accuracy required for good performance.
9. Inclusion of any expense which the operator may incur personally in accomplishing his job.
10. Detailed account of the mental and physical effort demanded by the job.

Job evaluation engineers have perfected a handy yardstick by which to analyze all key jobs after these have undergone job description. This breaks down jobs into four common characteristics, as follows: Skill, effort, responsibility, and job conditions. These go through their minute breakdown and further evaluation and finally your firm is ready for a translation of all these findings into hard-and-fast wage rates.

Up to this point in the procedure, engineers' methods used are more or less systematized. But when it comes to this most important part of job evaluation, engineers differ on their plans, depending upon their experience and their judgment in terms of a specific foundry. There are two distinct types of evaluation plans—the non-quantitative and the quantitative. Both of these have their scholarly adher-

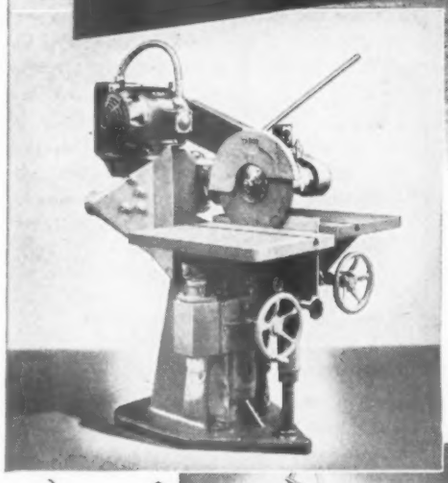
(*Continued on page* 188)

now in the TABOR-BRASIVE *Cutoff* line

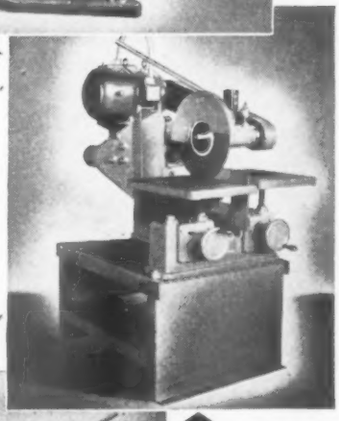


TYPE C15AJ

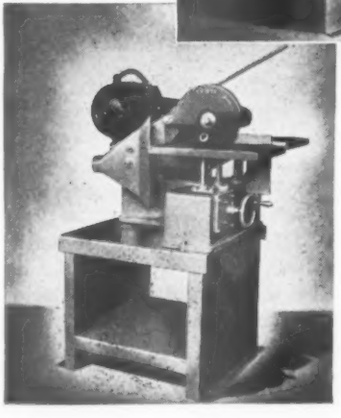
20" diameter wheels driven by a 15 HP 2-speed motor. Longer reach, more offset and greater chopping motion than on the Tabor C10AF. Wheel speed can be increased when the wheel wears to 17" diameter.



TYPE C10AF
Wheel Diameter 16"



TYPE D5AC
Wheel Diameter 14"



TYPE B7½AC
Wheel Diameter 16"

MEMBER

• Tabor-Brasive Cutoff production economies are such that users frankly say they could not have met war production requirements without them. If you produce the various non-ferrous alloys now demanded, you should consider the use of this machine. Remember, too, that Tabor-Brasive Cutoff Machines are not confined to the non-ferrous field. Equally startling results are obtained by users in cutting steel gates and risers; even some alloy iron is cut to advantage. Actually, the list of Tabor-Brasive users is a "Who's Who" of the leading foundrymen of America.

There is a Tabor-Brasive Cutoff Machine for every foundry cutting need. They are built in a complete range of sizes and types, and can also be furnished to meet special requirements. Write for information, giving details of your cutting problems.

If your answer is "Yes" to any of the following questions, you need a Tabor-Brasive Cutoff Machine:

Non-Ferrous Foundrymen—Do you require one man to cut off gates and risers?

Steel Foundrymen—Do you require one man to cut off gates and risers of 3-square-inch cross-section?

Grey Iron Foundrymen—Do you have difficulty in removing gates and risers from special alloy castings?

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Representatives: Snyder Foundry Supply Co., Los Angeles, Calif., Gallagher Foundry Supply Co., San Francisco and Oakland Calif.; Carl F. Miller & Co., Seattle, Wash.

"FALLS BRAND" ALLOYS

"FALLS" FLUX "A"

for

ALUMINUM

FALLS FLUX will reduce melting costs because it will efficiently separate the dross from molten aluminum thereby reducing rejections and scrap that are caused by dirty metal:—

—cleans, fluxes and removes gases, oxides and non-metallic impurities from all grades of aluminum.

—increases the metal yield about 3% because it puts all the metal usually lost in the dross back into the molten metal.

—does not smoke, fume or smell.

—is a dry white powder that will not absorb moisture and it can readily be handled with the bare hands without burning the skin.

Write for complete details.

NIAGARA FALLS

Smelting & Refining Corporation

AMERICA'S LARGEST PRODUCERS OF ALLOYS

BUFFALO 17, NEW YORK

(*Continued from page* 186)

ents and books have been filled for the college student's homework on the relative merits and demerits of each.

Boiled down and stripped of the "ifs" and "buts," engineers with long experience in foundries have formed a consensus in favor of the quantitative evaluation system because it allows a higher degree of accuracy through a novel system of *points*. The four basic job fundamentals—skill, effort, responsibility and job conditions—are thus subdivided into their many branches and assigned points. This procedure is far from a cut-and-dried affair, but will vary depending upon the engineer's experience and special conditions. One foundry may be given a point scale of 1-500 for skill, where another may be given only 200. This type of calculation is highly technical and for practical purposes no employer need decipher the codework.

Once the point structure has been set up, the rest of the work is completed in short order. The engineer graphs up a "scatter chart," as shown in the accompanying illustration, which indicates the newly-evaluated wage rates and the current rates in practice before the job evaluation. This system immediately turns up the rates out of line, whether they be too high or too low. And your job evaluation is now complete.

Examine System Regularly

A last word of warning. A job evaluation is far from a master-mind robot that runs on and on, without periodic examination or close scrutiny of results from time to time. One foundry executive, assured that the new system was a permanent fixture, promptly threw in a new job that arose on the scatter chart of evaluated jobs. In no time at all, this little Frankenstein grew into a monster to hound his sleep—because his one small arbitrary act threw the entire system out of kilter. It is true that an occasional check-up is in order—but the expert who installed the job evaluation should be called in.

In short, a job evaluation will become an effective part of running a successful foundry only if it is treated as management technique. And like any technique it must be developed and cared for over a period of time if it is to continue to render efficient service.

Summary:

Job evaluation must be molded to *your* foundry. Don't try to work out your own "home-made" plan.

On the question of how soon to put it in, don't rush in where angels fear to tread. Give job evaluation your serious thought in terms of what you want it to do. If there's been any recent labor trouble, allow at least a month for the

(*Concluded on page* 190)

Large Jobbing Foundry Standardizes on CARBOFRAX Linings

John P. Kelly—Brass Founder, well known producer of high quality aluminum bronze castings, uses CARBOFRAX silicon carbide linings in all 14 of his crucible type melting furnaces. Of the Walker-York design, the furnaces are coke-fired and feature pre-heated air with controlled blast.

Quickly reviewed, his extended experience with CARBOFRAX linings shows these profit yielding results.

- Lower refractory cost per lb. of metal melted because these more durable linings last longer.
- Improved crucible life. Retaining dimensions even after much service—with choking clinker formations eliminated, CARBOFRAX linings radiate heat uniformly to the crucible.
- Steady, reliable production. As these linings do not deform under most severe operating conditions, both moderate and peak demands are fully satisfied.
- Reduced installation cost. Made accurately to size with rugged interlocking joints the CARBOFRAX blocks are quickly, easily installed.

Such advantages are made possible by the high refractoriness, excellent resistance to spalling, cracking and flame erosion and high hot strength of CARBOFRAX linings. Their distinctive characteristics make these linings equally valuable for promoting greater production at lower cost in oil and gas fired melting furnaces.

Additional information on CARBOFRAX linings for specific installations will be gladly furnished on request. Simply write Dept. L-86, The Carborundum Company, Refractories Division, Perth Amboy, New Jersey.

SUPER REFRACTORIES

BY CARBORUNDUM

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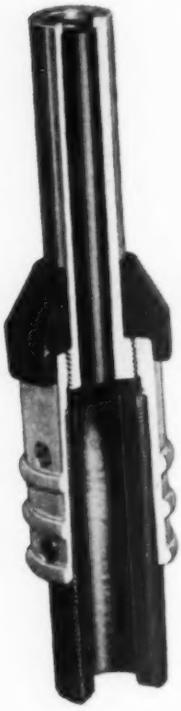

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WILL OUT-PERFORM A PANGBORN-NORBIDE*

● We feel safe in making this challenge because of the consistency with which Pangborn-Norbide* nozzles have outperformed their guarantee of 1500 hours with metal abrasive, 750 hours with sand.

● The liner is boron carbide—the hardest material ever manufactured for commerical use. Compared with iron nozzles, the Pangborn-Norbide also decreases air consumption from 10% to 20%, and by maintaining stream contour and abrasive velocity, improves blasting efficiency.

● Order nozzles from Pangborn Corporation, 284E Pangborn Blvd., Hagerstown, Maryland—*world's largest manufacturer of blast cleaning and dust control equipment.*

*Trademark of Norton Co. for Boron Carbide

MAXIMUM WORKER CONVENIENCE...

CLEANING SMALL METAL PARTS

● Improvements that help the worker do a better job *easier* are built into Pangborn's "Utility" Suction-Feed Blast Cleaning Cabinet.

● The 10" x 8" window is protected by a sliding screen which may be moved to the side for inspection of work, and permits wiping of vision window glass during cleaning. The vision opening is shielded against outside light.

● Arm openings are ample, and are fitted with abrasive-resisting rubberized canvas sleeves and gloves to protect the operator while handling the work and the blast gun. A push-and-pull rod controls the abrasive from inside the cabinet.

● Further facts in Bulletin No. 601. Address the Pangborn Corporation 284E Pangborn Blvd., Hagerstown, Maryland, *world's largest manufacturer of blast cleaning and dust control equipment.*

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

(*Concluded from page* 188)

tempest to die down.

But once you decide job evaluation is for you, don't expect it to chip out all your labor problems. It's an excellent technical tool—but not a substitute for efficient management.

Every employer first thinks that job evaluation will show overnight results. Not so. It takes at least six months to get results because it's planned on a long-range basis.

Very bad labor relations is to "spring" job evaluation on workers. It needs a well-planned "selling program" to put it over among workers. And don't sell the moon in ribbons. Everybody *won't* get a raise.

Also be sure to leave the way open for settlement of individual complaints *after* job evaluation has been installed.

Look for intangibles to register some important long-range savings. If you look for tangibles alone, you'll miss those important savings in worker morale and decreased labor turnover.

Until you're ready to have every job and operation in your organization classified and overhauled, don't think you have job evaluation. Half-way measures are worse than none.

As for time required to get job evaluation set up, don't rush the engineer. He needs time or else some serious errors will result. A few jobs evaluated each day is a full day's work.

Trial rates should *not* be set for new jobs. A sound job evaluation needs no trial period and new jobs just fall into line automatically.

In setting up an employee committee, don't give it veto power over the engineer's detailed findings. Limit its authority to advice-giving.

On period re-examination, don't tamper with job evaluation without calling in the expert. It's a permanent fixture once installed—and you may do it untold damage.

No! You don't have to be a giant in your field to make job evaluation pay off. Medium size foundries have proved that wide benefits can accrue to them.

Electric Steel Group Plans Meeting

The Electric Furnace Steel Committee of the Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, will hold its 1946 annual conference in Pittsburgh at the William Penn Hotel on Dec. 5, 6 and 7, according to Charles W. Briggs, chairman of the executive committee. Program for the conference now is being arranged under the direction of W. J. Reagan, chairman of the conference committee, and John B. Caine, vice chairman.

Sterling

Offers Better Cutoff Wheels To Speed Up Difficult Jobs

This folder provides complete specifications for cutoff grinding . . . Ask for your copy!

You can cut off metals and non-metals more efficiently with Sterling's "Wheels of Industry" . . they are engineered to do a better job of it—quickly!

These superior cutoff wheels lower costs on many jobs because they usually make a second grinding for finish unnecessary. They are accurate, cutting bar stock to within 0.005-inch. In comparison with other methods, they are much faster, often doing jobs twelve times quicker! Unannealed alloy steels can be readily cut off with Sterling Cutoff Wheels.

Save time, money and material by specifying and using Sterling . . . for wet or dry cutting off, they are the best obtainable.

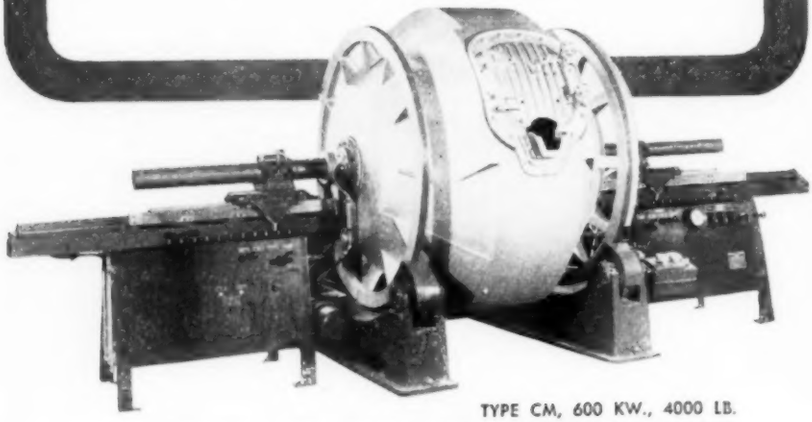
An analysis of your problem can be readily obtained. Write us today for the free services of a Sterling engineer . . . his years of experience are yours for the asking.

25 tons OF DUPLEXED IRON

IN AN 8 HOUR DAY—WITH THE

EFFICIENT NEW CM DETROIT

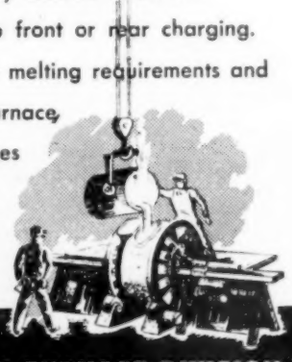
ROCKING ELECTRIC FURNACE



TYPE CM, 600 KW., 4000 LB.
NOMINAL COLD CHARGE, 8000 LB. MOLTEN IRON CAPACITY.

Many foundries are producing as many as 25 tons of iron per 8-hour day by using a Detroit Rocking Electric Furnace in duplexing operations. Cupola iron is carried to the Detroit Electric Furnace, alloys are added to produce the type iron required, and the melting operation is continued—swiftly, precisely, and under the positive control of one man. One or more cold charge heats may be run while awaiting the first metal from the cupola. Each duplexed heat can be of a different alloy, or the alloy may be changed after tapping part of a heat by making any desired additions.

Furnace design is adaptable to front or rear charging. We will be pleased to study your melting requirements and advise you how the Detroit Electric Furnace will give you the profitable advantages of duplexing and of producing "prescription iron."



DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

Permanent Mold Casting of Aluminum

(*Continued from page* 84)

They are painted very heavily with a permanent mold gate wash to insulate the mold in these areas and prevent the chilling of the metal before it reaches the cavity. A graphite coating is applied to lubricate moving parts for ease of action.

The close intervals of pouring molten metal into a mold is generally sufficient to maintain the proper operating temperature for good results. However, in some instances it may be necessary to heat up areas by applying a gas flame, while other areas may require a cooling by air to chill the mold. Before starting operation the mold should be preheated to an approximate temperature of 650 to 800 F.

Advantages—Interest in the permanent mold method of producing aluminum castings has increased considerably in the last few years. This interest is stimulated by the following distinct advantages over the sand molding method:

1. Economy of floor space. The average manually-operated mold takes up a floor space of about 4 ft square. In this small area an operator will produce twenty to sixty 5 to 20-lb castings per hour. By comparison, consider the floor area which would be covered in one day by molds of sand for this rate of production.

2. Economy of equipment. A permanent mold is complete. There is no need for a molding machine or flasks, sand supply, flask boards and other items used in sand molding. There is no shakeout process except in semi-permanent molds when a sand core is used for internal shapes which cannot be pulled.

3. Improved quality. Aluminum castings from a permanent mold are superior to sand castings in tensile strength and density. There is also a better dimensional uniformity. These castings can be made within a 0.005-in. dimensional accuracy or differential. This accuracy would be hard to meet in sand castings. Naturally this may mean many dollars saved in the machine shop by eliminating the necessity of machining some of the surfaces and also by reducing to a minimum the amount of metal to be machined off.

4. Appearance. Permanent mold castings approach, to some degree, the appearance of a die cast product. Costly cleaning and polishing time is reduced

(*Concluded on page* 194)

Simplicity
FOUNDRY EQUIPMENT
For
Jobbing and Production Shops

Produce Cleaner Castings; Reclaim Valuable Sands; Cut Cleaning Room Costs; Eliminate Flask Breakage; Prevent Costly Shutdowns; and Increase Capacity with Reduced Man-power.

5-ft. x 10-ft. "B" Single Deck Sand Screen

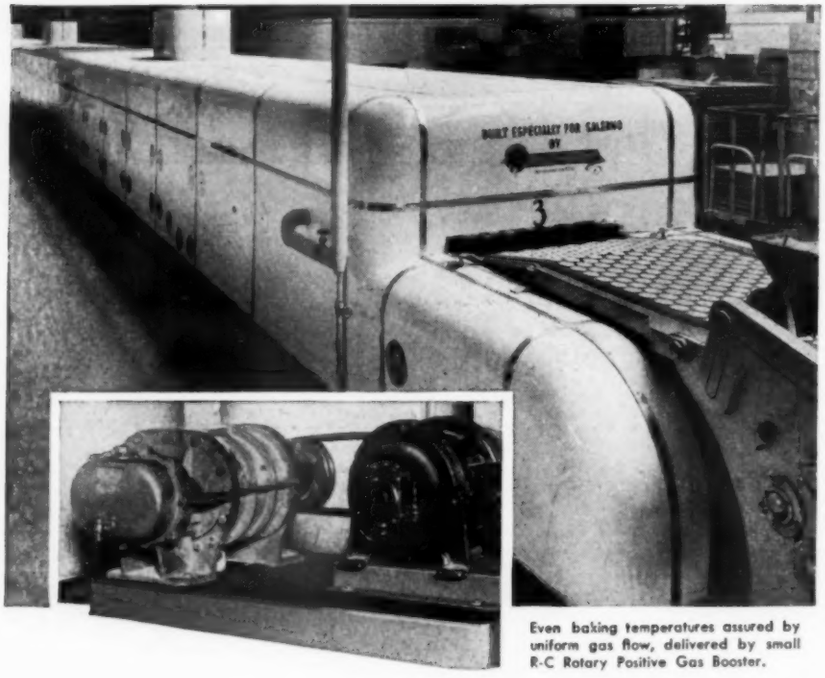
3-ft. x 5-ft. "SS" Shake-Out in Production Shop

Simplicity foundry equipment includes Shake-outs, both Portable and permanent types; Knock-outs; Sand Screens; Portable and Semi-Portable Screening and Conditioning Units; Core Sand Lump Crushers; and Hot Castings Conveyors.

Since 1933, several thousand of these Simplicity units have been installed in foundries producing Gray Iron, Steel, Malleable Iron, Aluminum and Magnesium Castings. Repeat orders produce 60% of our average yearly sales, showing user satisfaction with their Simplicity Units, which is the finest recommendation for any equipment.

6-ft. x 17-ft. Dual Shake-Out in Jobbing Steel Foundry

Simplicity
TRADE MARK REGISTERED
ENGINEERING COMPANY
DURAND, MICHIGAN



Even baking temperatures assured by uniform gas flow, delivered by small R-C Rotary Positive Gas Booster.

COOKIES, CHEMICALS, OR CASTINGS . .

they're all the same to

R-C *dual-ability*

ROTARY POSITIVE

No small valves, vanes or parts in the simple R-C Rotary Positive units—successfully used for almost a century of industrial progress.

CENTRIFUGAL

R-C Centrifugal Blowers offer an extensive choice of proved modern designs, where this type is better adapted to any specific application.

Uneven flow of fuel or air in industrial heating processes causes varying temperatures, inferior production quality. That's costly, whether you're processing foods, plastics, metals or textiles.

Roots-Connersville Rotary Positive Blowers and Gas Pumps have a long record of success in such applications. With only two moving parts, their simple, sturdy construction assures long-time, trouble-free performance.

Or, if Centrifugal Blowers or Exhausters meet your needs better, you'll enjoy similar full satisfaction from the advanced engineering built into this type of R-C units. We're unbiased in our recommendations because we build both types equally well. That's what we mean by R-C *dual-ability*.

We'll help you select standard R-C equipment of any capacity, or design special units to match your needs. Consult us without obligation.

ROOTS-CONNERSVILLE BLOWER CORP.

One of the Dresser Industries

608 Madison Ave., Connersville, Indiana

Roots Connersville Since 1854

BLOWERS FOR EVERY NEED

ROTARY POSITIVE AND CENTRIFUGAL BLOWERS • EXHAUSTERS • BOOSTERS
LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

(*Concluded from page* 192)

to a minimum. Fine lettering and trade monograms are reproduced in good detail.

Despite the foregoing advantages of the permanent mold method, as in almost everything there are disadvantages which should be considered.

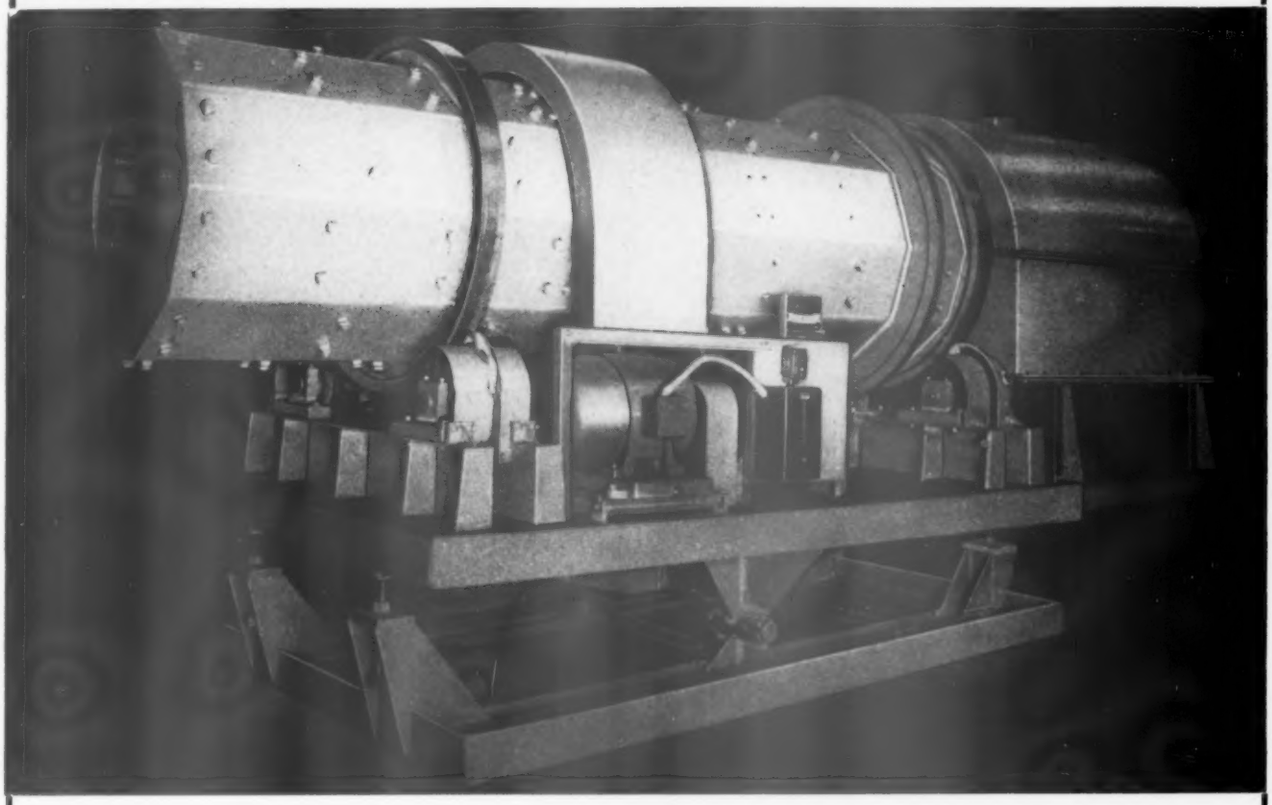
Disadvantages—Generally a mold may cost two or three times more than metal pattern equipment. This cost prorated per casting in small orders would be prohibitive. Consequently, only large production items have a cost saving advantage. Castings with deep draws and extreme variation of wall thickness, which encourage shrinkages, are not good permanent mold products. Many items which, because of their shape, character, large size or small quantity requirements, rightfully belong to the sand mold process. For instance, when the design of the casting is such that the inside and the outside of the job involves considerable coring, then there remains very little, if any, advantage in the permanent mold system. Also, in the casting of small parts when approximately 20 to 40 patterns can be placed on a match plate, the sand mold method is more economical. There are also those odd-shaped castings which present a great deal of difficulty in developing partings or perhaps in feeding or risering the casting and for these reasons would be better sand mold jobs.

The permanent mold process of producing aluminum castings is not an experiment. It is a practical and economical approach to the supplying of high quality aluminum items in large quantities. Mold costs are soon liquidated in large orders. Better castings are produced faster, they are more accurate and reduce to some degree the machining time as well as the polishing work which may be necessary.

Offers Inspection Handbook

American Welding Society has published "Inspection Handbook for Manual Metal-Arc Welding," which is intended to serve as a reliable source of information on any welding inspection problem. The handbook containing 156 pages, covers the requirements and duties of a welding inspector, methods of testing welds, and includes a comprehensive description of weld inspection by visual, magnetic-particle and radiographic methods. One section discusses the principal types of weld defects and indicates how they be detected and corrected. Copies may be obtained from the American Welding Society, 33 West 39th St., New York 18, at $1.50 per copy.

RANSOHOFF AUTOMATIC CLEANING MILLS



ANOTHER "*Special Problem*" SOLVED BY RANSOHOFF

THE drum is mounted in a swinging frame so that the pitch of the drum can be adjusted to regulate the speed at which the work passes through. Mill rolls on machined bands and chilled rollers.

The conveyor brings castings and sprue to the mill where castings are broken from sprue and both are discharged at the opposite end on to a conveyor where inspectors separate and inspect. Castings are then ready for anneal.

easy, gentle, economical, not self-destructive

THE NEW RANSOHOFF COMPOSITE LINER

now standard on all Ransohoff Cleaning Mills.

This combines the wearability of chilled iron with the strength and malleability of steel plate. On the machine shown, liner has been in use 2 years or more and shows little or no wear.

CONTINUOUS MILL for preliminary cleaning and de-spruying hard iron malleable castings

Send us a sample batch . . . we will make exhaustive tests and report to you how you can save on your cleaning.

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MACHINERY AND ALLIED PRODUCTS INSTITUTE EQUIPMENT

N. Ransohoff, Inc.

TOWNSHIP & BIG 4 RR — CINCINNATI 16, OHIO

This Maehler unit...

replaced { 4 car-type, coke-fired ovens / 1 drawer-type oven

The Maehler unit shown above, installed at the Harnischfeger Corporation in Milwaukee, Wisconsin is a double compartment four rack Lift Door Core Oven with an oil-fired automatically controlled airheat system. Doors are equipped with new electrically-operated lift. Push buttons to operate the doors are mounted on flexible extension brackets to front of oven, permitting lift truck operator to open doors while guiding truck into position for loading core racks into oven.

WHEN THE Harnischfeger Corporation of Milwaukee, Wisconsin modernized its facilities for core baking, the Maehler Lift Door Core Oven shown above was installed . . . The results were typical . . . the Maehler unit did a faster and more thorough core baking job . . . a job that enabled it to replace four car-type, coke fired ovens and one drawer oven! This meant a substantial cut in production costs as well as better-baked cores.

The new Maehler oven, a four rack, double compartment oven with an oil-fired automatically controlled airheat system, handles four 5 ft. 6 in. x 5 ft. 6 in. x 5 ft. adjustable racks. After installation the core baking schedule of the oven was two bakes per day on small and medium size cores. Larger cores were baked overnight. Total weight of cores per bake is approximately 8,000 to 10,000 pounds.

For *better* cores, baked faster and at lower cost . . . plan now to install a Maehler Core Baking Oven in your plant.

MAEHLER

Industrial Ovens and Furnaces for Core Baking, Mold Drying, Heat Treating, Enameling, etc.

THE PAUL MAEHLER COMPANY

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NORFOLK NAVY YARD

Holds Foundry Conference

THE open house and foundry program originally planned for the Norfolk Navy Shipyard, Portsmouth, Va., May 28-29, and postponed on account of the threatened railroad strike, was carried out in all particulars Tuesday and Wednesday, June 11-12. Prominent foundrymen, principally from the Chesapeake Bay area as well as representatives from both coast Navy Yards and Stations and the Navy Department to a total of approximately 50, enjoyed the hospitality of the Shipyard commandant and staff and noted with approval the changes and improvements in the foundry, and the extensive installation of mechanical equipment in every department, including molding, melting, coremaking, cleaning, sand collection, preparation and distribution. One of the most important features, one fully appreciated by the visitors, was that the conversion program was carried out while the shop was running full handed, three shifts, seven days per week.

Officers presenting the addresses of welcome touched upon the ancient history of the Yard dating back to a period before the United States was an independent nation. Known as the Gosport Marine Yard, it was used by the British in 1752 as a careening ground and repair station for vessels operating on the western side of the Atlantic. In its long and varied career it has been under five flags—British, Virginia Colonial, State of Virginia, Confederate States and the United States.

City Grows Rapidly

Growth and expansion of the navy yard has been an important factor in the growth of the city and its development into a great ocean port. Peak employment at the Norfolk Naval Shipyard during the recent war was approximately 45,000. Total number in the foundry operating on three shifts was approximately 1000.

At the first technical session, S. W. Brinson, Master Molder, presented a paper on "Foundry Modernization," dealing with the subject in general and in particular with the many radical changes in methods, technique and mechanical equipment installed recently in the foundry to facilitate production of ferrous and nonferrous castings in the most efficient and economical manner. An extensive article in two parts describing equipment and present method of operation has been written by Pat Dwyer and will be presented in early issues of THE FOUNDRY.

Cupolas and large electric furnaces are charged mechanically. Movable hoods over the electric furnaces and shakeout stations collect smoke and dust and maintain a clean atmosphere in the vicinity of these units. Molds for large castings are rammed by a sandslinger which travels on a track in the center of the main bay and on heavy jolt ram rollover machines. Small molds are made on a battery of molding machines set up in line on both sides of the columns separating the main bay from the east side bay.

Molds in the main bay are for iron and steel castings. Molds in the side bay are for nonferrous castings. Sand hoppers over the machines are replenished by long belts which bring prepared sand from the mulling stations. Molds from the machines are placed in succession on roller conveyors. Metal is distributed in a manner that prevents any of the conveyors from becoming overloaded. The poured molds are dumped over the ends of the conveyors, and sand falls through a floor grating, which catches the castings. A belt under the floor carries the sand back to the preparation point, while a separate conveyor unit carries the empty flasks back to the molding stations. Metal in the nonferrous foundry is distributed by a monorail hoist and two light bridge cranes.

Many Cranes Available

The center or main bay is served by six 5-ton wall cranes, one 10 and two 15-ton bridge cranes mounted on a runway which extends on the outside over the flask storage yard, and one 40 and one 80-ton bridge cranes which travel on a runway high above the others. The upper cranes are equipped with 10 and 20-ton auxiliary hoists, respectively.

After the presentation of a paper "X-Ray and Radiography Techniques," by J. A. Duma, foundry metallurgist, and subsequent discussion, the remainder of the afternoon was devoted to a tour of foundry.

At the Wednesday morning technical session a paper, "Knock Off Risers," was presented by S. W. Brinson, Master Molder, and at a final session a paper, "Rapid Chemical Control in Foundry Practice," was presented by R. S. Gibbs, principal chemist. Remainder of the afternoon was spent in a tour of the pattern shop, chemical laboratory, metallurgical laboratory, x-ray laboratory and foundry and machine shop.

According to the author, the use of the knock off or so-called Washburn riser has been so successful that it is now standard practice to use it wherever possible. The basic principle involves the utilization of a relatively thin core, which constricts the riser at the point of attachment to the casting, whereby minimizing the cost of burning off a large riser. Advantages of a heavy riser are retained since the thin core heats quickly to a relatively high temperature to insure feeding of the casting. The author described briefly the steps involved in the construction of the riser.

On most castings the riser may be knocked off easily with about three blows of a heavy sledge hammer. This eliminates the necessity for cleaning or chipping away the sand that is burned on to the casting at the junction of casting and riser before cutting off the riser with oxyacetylene torch, since the latter will not burn through adhering sand. The casting arrives in the cleaning room requiring only snag grinding and finish insofar as the riser is concerned. Experience has shown that the riser will reduce labor charges in the cleaning room, a constant bottleneck in steel foundries.

IBF HOLDS ANNUAL CONFERENCE

(*Continued from page* 97)

determine the atomic structure of solids.

The British Foundry medal to S. L. Fry, Kent Alloys Ltd., for his paper on "Preliminary Investigations of Metal Pouring by Cine-Radiography."

Diplomas were awarded to: N. C. Blythe for his paper on "Sand Supply to Molding Machines from Overhead Hoppers"; T. Cook for his paper "Inspection in a Mechanized Foundry"; R. M. Brown for his paper "Duplex Pump Castings"; D. H. Young for his paper "Cupola Operation"; A. B. Bill and and G. Peers for their paper on "Mass Production of Tank Wheels in Black Heart Malleable Iron."

The election of officers followed. D. H. Wood, managing director, Constructional Engineering Co. Ltd., Birmingham, was elected president. P. H. Wilson, works director, the Stanton Ironworks, and chairman of the council of the British Cast Iron Research Association, was elected senior vice president. R. B. Templeton, managing director, Ealing Park Foundry Ltd., was elected junior vice president. The following members were elected on the council for a period of two years: H. Bunting, Dr. A. B. Everest, Colin Gresty, A. Phillips, J. J. Sheehan.

The meeting was then called upon to vote on certain alterations to be made to the by-laws of the institute. The major proposed alteration was that the qualifications for admittance to the various grades of membership should be based upon a combination of practical foundry experience and technical training rather

CLOCK THE SAVINGS

you gain with

FLOATEX

Yes, you save time—and *plenty* of it—with a Robins Floatex Foundry Shakeout — *Job-Engineered* to meet your exact requirements.

With a Floatex, for example, *one man* can completely shake out an 8-ton dry-sand cope, 9 feet square and 12 inches deep, *in only 35 seconds!* What's more, *one man* can center a flask on the Floatex . . . operate the unit . . . and remove the material left on the surface after shaking. A Robins Floatex also reduces flask breakage to an absolute minimum.

Why not write today for the Robins answer to *your* foundry problems? Complete information on Robins Floatex Foundry Shakeouts or other Robins materials handling products will be gladly furnished on request.

Robins Floatex Shakeouts are made in Portable models for loaded flask weighing up to 17 tons; in Standard models, up to 100 tons or more—non-discharging and self-discharging types; with and without flask loaders.

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AMERICA'S ONLY COMPLETE MATERIALS HANDLING SERVICE — Hewitt and Robins unite to offer you 134 years of combined experience in Job-Engineered rubber products and machinery for every materials handling problem you have.

than upon the position which an applicant may hold in his company or firm at the time of application. Applicants would have to satisfy the requirements of a qualifying examination and the various grades of membership would carry the right to use the initials of the Institute after the member's name. The alterations to the by-laws were adapted unanimously.

V. C. Faulkner, past president of the institute, then proposed that a message of greetings be sent to the American Foundrymen's Association and the allied associations on the continent of Europe. The chairman read messages received from Professor Pisek, president of the Czech association; Paul Bastien, president of the French Association, and Dr. Spies, president of the Dutch Association. He expressed pleasure at welcoming representatives of these associations at the conference and also visitors from Belgium, South Africa and Sweden.

The chairman then inducted the president-elect in the chair. Mr. Wood, in taking office, first proposed a vote of thanks to G. Gardom for the outstanding manner in which he had presided over the destinies of the Institute for the past two years. This motion was adopted with acclamation.

Membership Increased Steadily

In his presidential address, Mr. Wood mentioned that within a radius of 20 miles from the center of Birmingham there were no less than 300 ferrous and nonferrous foundries. He then referred to the origin of the institute, which was originally styled the British Foundrymen's Association, and recalled the names of the seven founders who, in 1904, laid its foundation: R. Buchanan (the first president), J. Ellis, Mr. Finch, F. J. Cook, Mr. Vickers, Mr. Shore, Mr. Muirhead. Mr. Cook, who was present at this conference, was the only surviving member. The first convention was held in Manchester in August, 1904, when the membership had reached 98, and no less than 92 attended the convention. Fifteen years later, in 1919, at the Liverpool conference, it was decided to alter the name from the British Foundrymen's Association to the Institute of British Foundrymen. The story of the institute has been one of continued progress, and even during the war its membership increased by over 50 per cent.

In 1925, at a meeting mainly of members of the Institute held in Birmingham, it was decided to form a research association. That body, the British Cast Iron Research Association, has also grown and developed into a strong organization.

Dealing with the activities of the industry during the war, the president mentioned that the British iron foundries

(*Continued on page* 200)

Welding cast iron?

Here's a way...

to get good welds on the toughest jobs

SEEMS as though there's no end to the fine reports we get on Ni-Rod.

Welding shops are using Ni-Rod for jobs they'd never tackle before. *Foundries* are using Ni-Rod to repair defective castings quickly and easily. *Maintenance men* are using Ni-Rod for time- and money-saving repairs of broken and worn castings.

Ni-Rod is even being used on production lines.

Why does one electrode find such broad use?

Because Ni-Rod welds are strong welds... sound welds ... machinable welds.

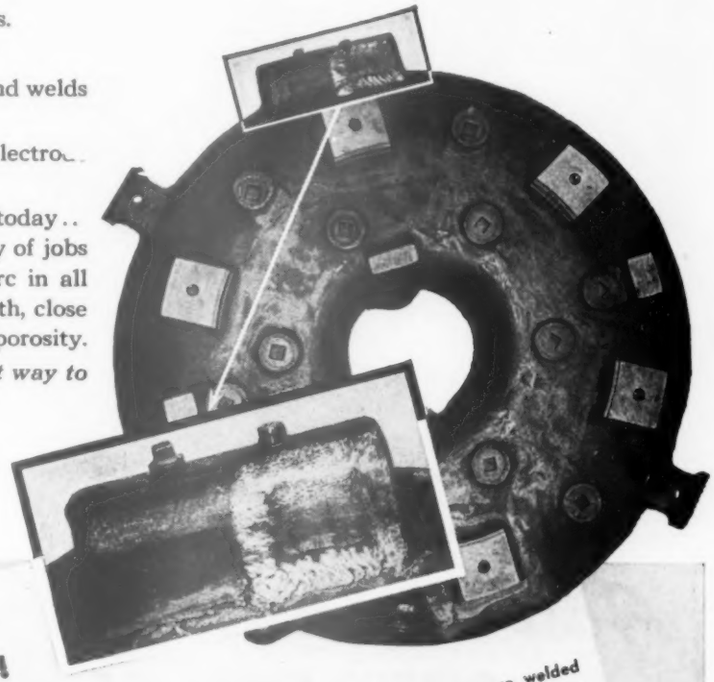
And... because Ni-Rod is the easiest-handling electrode ever developed for welding cast iron.

If you haven't tried Ni-Rod, order a package today.. sizes are 1/8", 5/32" and 3/16". You'll find plenty of jobs for this electrode. Ni-Rod gives you a stable arc in all positions on either a.c. or d.c. Deposits are smooth, close to the color of cast iron and free from cracks and porosity.

Welders who use it, say, *"Ni-Rod is the easiest way to get the best welds in cast iron."*

Send for
Ni-Rod Instruction Booklet

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.



NON-POROSITY was a "must" for this Ni-Rod repair job!

COMPANY
B. F. Goodrich Company, Akron, Ohio.

CASTING
One half of a steam-jacketed tire mold.

DEFECT
A thin section just above the steam and condensate ports.

PREPARATION OF THE WELD
The thin section was cut away until sound metal of at least ¼" wall thickness was found at all boundaries of the cut.

A steel patch plate was then fitted into the opening. Edges of both plate and the surrounding cast iron were beveled to a vee of 75-90 degrees.

The entire half of the mold was preheated to 300° F.

WELDING
Using Ni-Rod, the inner and middle seams were welded and allowed to cool somewhat. Then, the outer seam was welded and lightly peened to counteract contraction stresses. Mold was allowed to cool slowly to room temperature.

TESTED
At 200 psi. water pressure.
At 100 psi. steam pressure.

COMMENTS
Several molds with similar casting defects have been repaired in this manner. No porosity has been detected. The welding has caused no appreciable distortion.

INCO NI-ROD

NI-ROD IS DISTRIBUTED BY:

WHITEHEAD METAL PRODUCTS COMPANY, INC.—Baltimore, Boston, Buffalo, Newark, New York, Philadelphia, Syracuse

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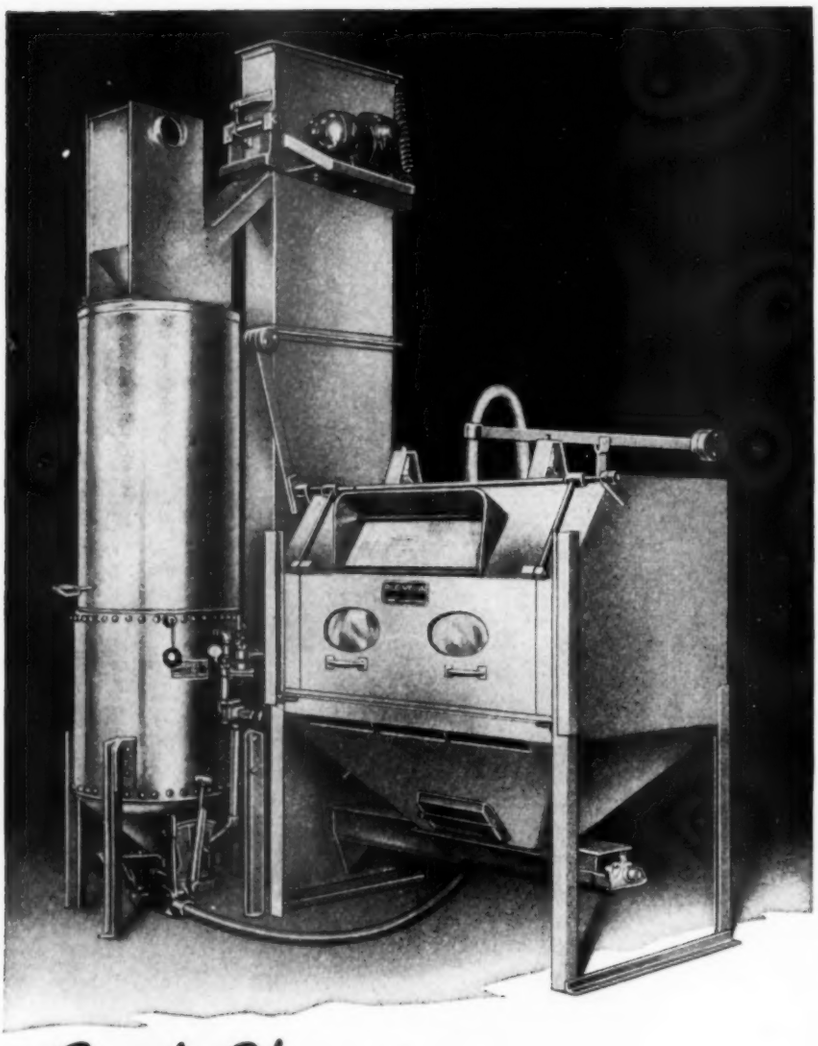

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by **DIRECT PRESSURE BLAST!**

Ruemelin Blast Cabinet provides a fast cleaning action by direct pressure blast. Handles a great variety of jobs. Simple to operate. No skilled labor needed. Sanitary. Operator need not wear helmet. Front door loading. Saves footsteps and floor space. Low maintenance cost. No pits or foundation required. Shipped assembled for low installation cost. Handles all classes of abrasives. Over 1,000 in service in foundries, welding shops, steel treating plants, airplane factories, etc.

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Also manufacturers of Welding Fume Collectors, Abrasive Handling Systems, Cloth Dust Filters, Blast Rooms, and accessories.

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RUEMELIN

SAND BLAST EQUIPMENT · TUBULAR DUST FILTERS

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(*Continued from page* 198)

produced 12¼ million tons of castings in the five years 1940 to 1944. In the same period the steel foundries produced 1½ million tons, and the light alloy foundries one quarter of a million tons of aluminum castings and 80,000 tons of magnesium castings.

Coming to postwar conditions, the president referred to the Mechanical Development Committee of the institute, formed in 1943 at the suggestion of J. Gardom to prepare a report on the equipment available to foundries proposing to adopt either complete or partial mechanization. The rest of the address dealt with labor problems.

At this time one of the major bottlenecks in the country's production is due, not to the lack of capacity of the foundries, but to the shortage of labor, and it was urged that steps be taken to break down the lack of inclination of young people to enter the foundry industry.

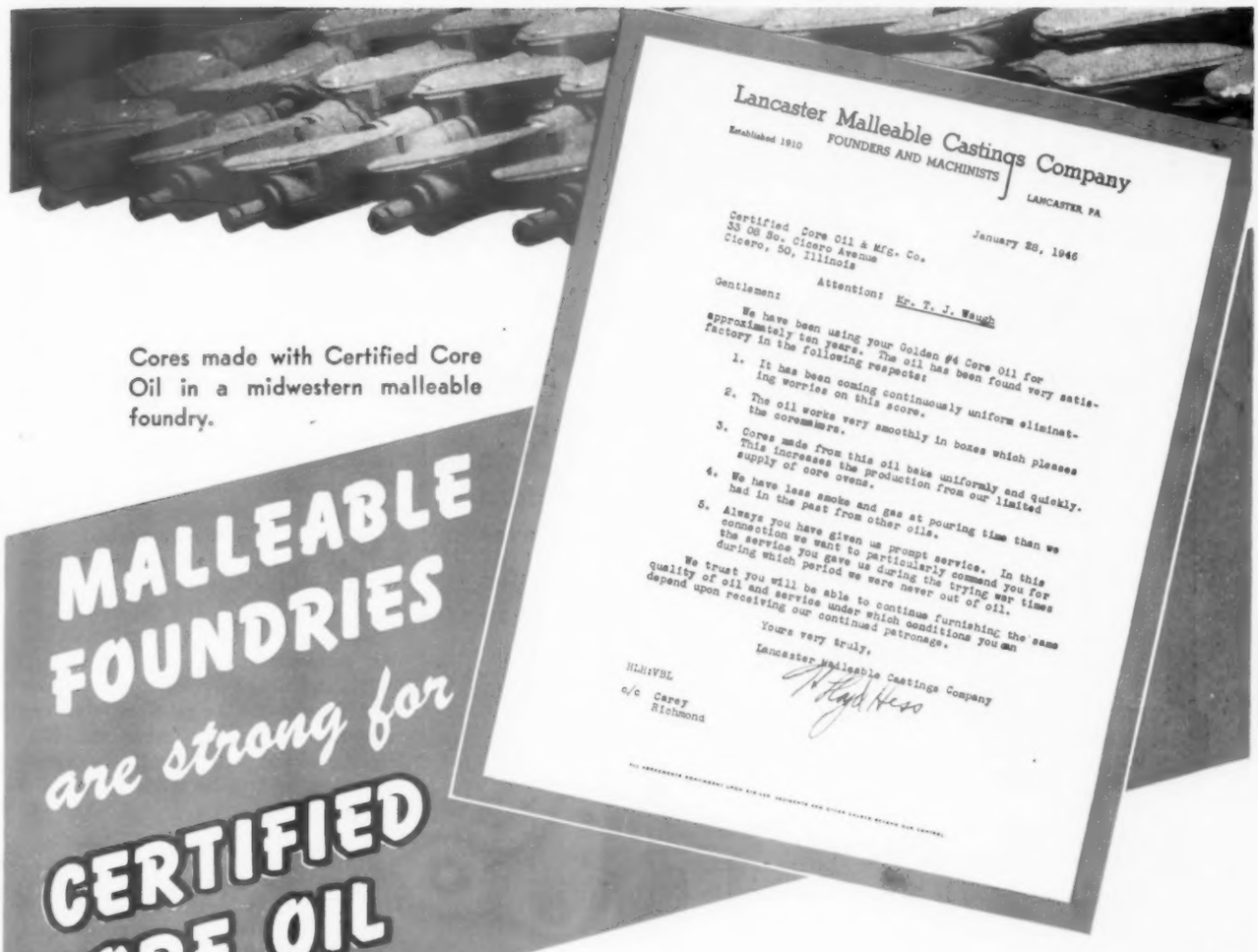
Lecturer Reviews Factors

The afternoon session opened with the presentation of the Edward Williams Lecture, which was delivered by Sir Claude D. Gibb, C. A. Parsons & Co. Ltd., who during the war occupied various executive posts at the Ministry of Supply. The lecture, entitled "Fabrication and Castings," will be published in a future issue of THE FOUNDRY. The lecturer reviewed the main factors that influence the choice betwen welding and casting certain parts. He showed that casting would always play a prominent part in the field of engineering products but he emphasized the necessity of greatly improving the conditions of work in foundries in order to attract workers. C. E. Williams, past president of the institute, who was present, proposed in person the vote of thanks to the lecturer.

Papers presented at the meeting were divided between two separate sessions. The American exchange paper, "Fluidity of Molten Metals," by K. L. Clark, Naval Research Laboratory, Washington, was given jointly with a report by subcommittee T.S.6 of the Technical Council of the institute on "Control Tests for Gray Cast Iron" and both papers were discussed together. The American exchange paper was presented in abstract by R. C. Tucker, member of the Technical Council of the institute, and the subcommittee report by its chairman, J. Blakiston.

The terms of reference of the subcommittee were: "To investigate and make recommendations on rapid forms of shop control tests mainly applicable to molten gray cast iron." The report itself reviewed quick check tests which may be made on gray cast irons to en-

(*Continued on page* 202)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Established 1910
FOUNDERS AND MACHINISTS
LANCASTER, PA.
January 28, 1946
Certified Core Oil & Mfg. Co.
33 08 So. Cicero Avenue
Cicero, 50, Illinois
Attention: Mr. T. J. Waugh
Gentlemen:
We have been using your Golden #4 Core Oil for approximately ten years. The oil has been found very satisfactory in the following respects:
1. It has been coming continuously uniform eliminating worries on this score.
2. The oil works very smoothly in boxes which pleases the coremakers.
3. Cores made from this oil bake uniformly and quickly. This increases the production from our limited supply of core ovens.
4. We have less smoke and gas at pouring time than we had in the past from other oils.
5. Always you have given us prompt service. In this connection we want to particularly command you for the service you gave us during the trying war times during which period we were never out of oil.
We trust you will be able to continue furnishing the same quality of oil and service under which conditions you can depend upon receiving our continued patronage.
Yours very truly,
Lancaster Malleable Castings Company
HLH:VBL
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Richmond

Cores made with Certified Core Oil in a midwestern malleable foundry.

MALLEABLE FOUNDRIES *are strong for* CERTIFIED CORE OIL

The letter from Lancaster reflects the opinions of the many malleable foundries which are using Certified Core Oil. It is preferred by the core makers because it works smoothly in the boxes and does not crust readily; by pourers because an absolute minimum of gas is thrown off during pouring; by shake-out crews because it produces freely collapsible cores with no burn-ins; and preferred by management for its uniform quality, moderate price, and our dependable nationwide service.

For the same reasons, Certified Core Oil is the choice of an ever-growing host of foundries of all types.

Certified Core Oil is made in three general groups, and each in a number of grades. One of these grades is the final answer to your core oil problems.

Tell us the grade and number of the core oil you use, its color, your type and mesh of sand, and your oven conditions. Without obligation, our laboratory will prescribe your ideal core oil.

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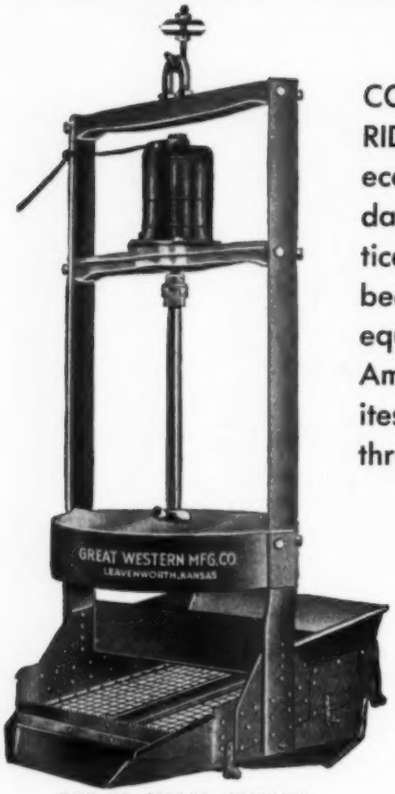
COMBS GYRATORY FOUNDRY RIDDLES



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COMBS GYRATORY FOUNDRY RIDDLES assure the greatest economy and efficiency in today's high speed foundry practice. These Riddles have long been accepted as standard equipment in foundries all over America and remain the favorites of modern foundrymen throughout the industry.

COMBS GYRATORY FOUNDRY RIDDLES and Equipment are available to you in Foundry Supply houses everywhere. Full information will be sent at your request.

Extra Screens Save Money

Rims are made of heavy steel. Bottoms of extra heavy galvanized after woven wire cloth.

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F.O.B. LEAVENWORTH

Great Western
Manufacturing Company
LEAVENWORTH, KANSAS

(*Continued from page 200*)

sure that metal delivered from a foundry melting furnace is suitable for the castings for which it is intended. The visual tests reviewed included: (a) chill tests; (b) shrinkage tests; (c) fluidity tests. Analytical tests included: (a) spectrographic methods; (b) colorimetric methods; (c) visual comparison colorimetric methods; (d) normal wet gravimetric or volumetric methods; (e) spot test methods; (f) special techniques. Mechanical tests comprised tensile, transverse, hardness and impact tests. Mention was also made of metallographic methods.

The discussion was opened by R. B. Templeton, who presided at the session. He pointed out that visual tests are the only type of test that can be done between tapping and filling the molds and requiring no expensive apparatus. A discussion on optical pyrometer readings brought out the fact that the corrections depend not only on the departure from "black body" conditions, but also upon the temperature, composition of the metal and other factors. Mr. Tucker cited the case of an alloy in which no correction was to be made at 1320° but above and below that temperature corrections had to be made in opposite directions.

Keep Test Nearly Obsolete

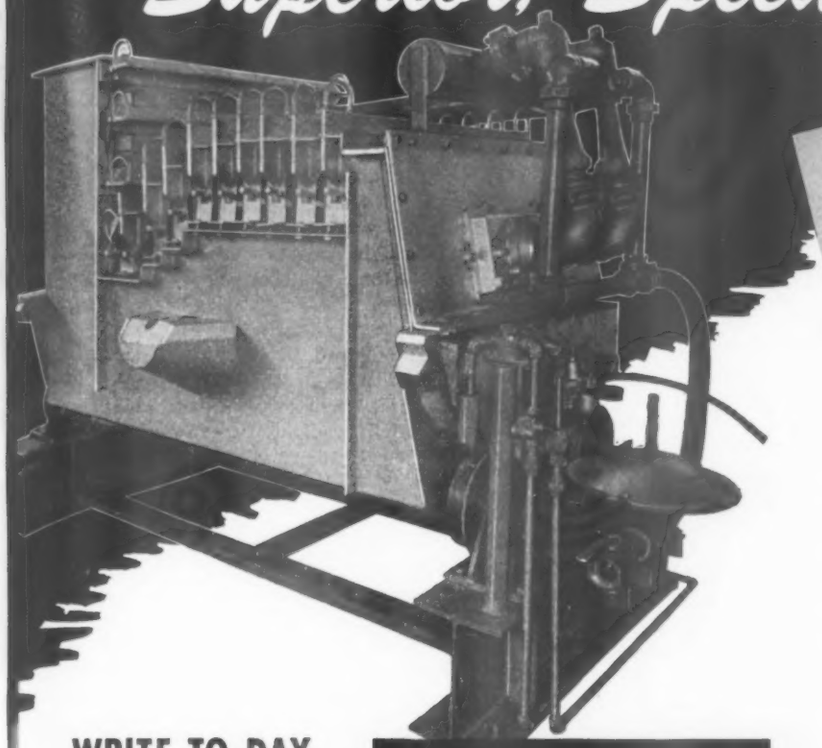
Answering a question from Ben Hird, Mr. Blakiston said the Keep test was not now considered of very great value, especially for the higher duty alloys, but it was useful for ordinary gray iron where the smaller foundries found it difficult to employ other tests.

H. J. Young said that he had used the spiral test soon after it had been first employed in Germany; he found it inconclusive for ordinary gray iron. W. Jones, a member of the subcommittee, said that where the fluidity test gave low results, the defects in castings were consistently more numerous and the test had some practical value. The discussion turned on the factors affecting fluidity, and Mr. Tucker, while agreeing that temperature was not the only factor, said he thought like M. Clark, that control of the temperature in the fluidity test should be made in the shop and a record should be kept for comparative purposes. He said that different methods of gating may be required for different alloys. He agreed with one speaker that eutectic alloys seem to run better than non-eutectic alloys. P. A. Russell emphasized the fact that the report of the subcommittee was not confined to high duty irons.

J. L. Francis said he would like to see a standard fluidity test piece; the test was useful and apart from giving indications on the behavior of the metal, it enabled the following of variations

(*Concluded on page 204*)

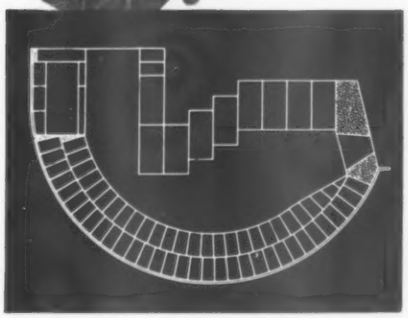
Use STROMAN FURNACES for *Superior, Speedy Melting*



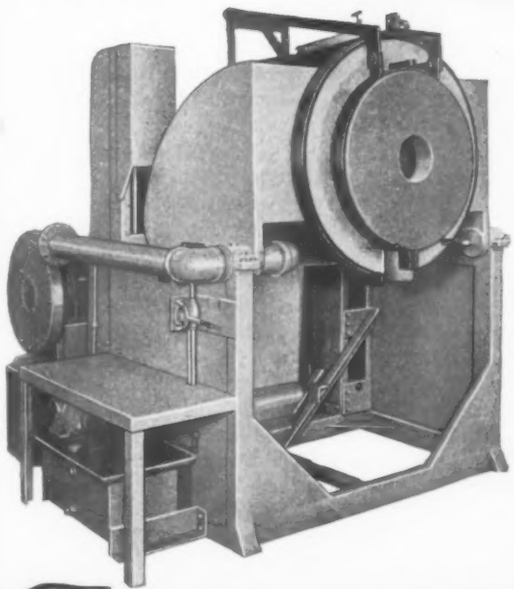
SKLENAR FURNACES FOR MELTING BRASS, BRONZE, ALUMINUM

Sklenar Non-Crucible, Direct Fired, Improved Reverberatory Melting Furnaces are the fastest melting furnaces built . . . Quality is unexcelled, both physicals and chemicals. Made in sizes to handle 300, 500, 750, 1000, and 2000 pounds brass capacity they are without a doubt the most advanced, efficient, and economical non-ferrous melting furnaces on the American market . . . however hundreds are in use in England where they were originated. BRASS is being melted in the astounding time of 15 to 40 minutes, depending on the size of furnace.

WRITE TO-DAY FOR COMPLETE LITERATURE ON ALL TYPES OF NON-FERROUS METAL MELTING FURNACES.



The furnace illustrated is also highly successful in the making of GREY IRON CASTINGS . . . and melting time for this metal has been clocked between 30 and 60 minutes a heat . . . producing only the best quality grey iron. With a Sklenar Furnace you can operate your grey iron foundry like a brass foundry, by pouring successive heats throughout the day, using the same floor space. Sklenar Furnaces are also highly successful in the melting of ALUMINUM, doing their melting job in the fastest time ever known and giving excellent quality.



Sklenar design is unique. Metal is charged into a hopper which is also an exhaust from the combustion chamber. Here metal is preheated and melted at the throat of the hopper. Cold metal does not reach the molten bath. Charging is continuous. These furnaces will melt faster and show fuel savings from 30 to 40%; as the combustion chamber is heated by the same fuel used to melt the metal in the throat of the hopper.

Sklenar Furnaces may be fired by either Gas or Oil. Full information will be sent upon request.

STROMAN STATIONARY LIP POUR CRUCIBLE MELTING FURNACE

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DIVISION OF

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(*Continued from page 202*)

in charges and other factors. Mr. Tucker said he would also like to see a standardization of the wedge test, with a specific roundness to the edge. Reverting to the fluidity test he pointed out that the subcommittee favored the horn gate, whereas the American paper favored the vertical down gate.

E. H. Brown, referring to pyrometer readings said these were influenced by the incidence of the rays; in the discussion that followed it was said that readings were more accurate on a moving stream of metal than on the surface of a bath which was covered by a film. In general, it was more simple to use an immersion pyrometer than a radiation instrument. G. L. Harbach asked whether the wedge test gave indications of variations of composition of the metal. The answer was that good curves were obtained when the silicon was constant and carbon varied, but not in the reverse case; it was also found that the result depended upon the accuracy of the edge of the wedge. J. H. D. Hobson, a member of the subcommittee, said that the wedge test was not an analytical test but a comparative one.

Claim Well Established

At another session two papers were discussed together—"Hot Blast Cupola Design," by E. Longden, P. R. Jackson & Co. Ltd., and "Experiences With Balanced Air Feed in the Cupola," by T. H. Taft, Idoson Motor Cylinder Co. Ltd. and H. A. Hallett, Metronic Instrument Co., Ltd. In the conclusion of his paper, Mr. Longden states that the case for the hot blast cupola seems well established, in particular by Vial with his Griffin cupola and MacKenzie-Moore cupola. Fuel conservation was an interesting factor. In the second paper the authors state that remarkable improvements in control of the melting conditions can be obtained by paying attention to the air feed. When the tuyere feeds are balanced the lining wear is more uniform and the heat is uniformly distributed.

L. W. Bolton, convener, Melting Furnaces Subcommittee, in opening the discussion, said that before the war, when there were about 30 hot blast furnaces in the United States, it was agreed that they gave a higher output and a higher tapping temperature; he did not think, however, that these factors justified the high cost of installation and maintenance except in special cases; there was also conflicting evidence in regard to fuel saving. F. J. Cook mentioned investigations made in Germany by the late John Shaw, who turned down the hot blast cupola on account of the high cost.

John Cameron related how he had made a small and inexpensive modification to a very old fashioned cupola, which resulted in the air being preheated to about 150 C and, as a result, the cupola could be used successfully for castings of high specification.

Dr. L. Jenicek, of Czecho-Slovakia, said that according to Piwowarsky preheating the air within a range of 600 C was of greatest interest, but additional preheating plant is necessary and it is expensive. He mentioned a 24-inch cupola at Schaffhausen which gave an output of 5 tons; he said that some of the cupolas mentioned in the paper, mainly of German design, had not been used in practice. He said that of some 10,000 cupolas used in the United States, only a small number used hot blast.

J. G. Pearce, director of the British Cast Iron Research Association, said he had recently seen in Chicago a Griffin hot blast cupola and he was told there was no appreciable increase of output. He said that before the war research workers of the BCIRA asked themselves if a cold blast cupola could be designed which would be truly economical from the point of view of fuel consumption and the answer was in the affirmative. J. Blakiston mentioned the high cost of maintenance of hot blast cupolas and that this outweighed other considerations. He recalled that when the basic steel process was adopted in England cupolas were used for melting the iron for the converters and the air was heated in stoves to 550 C; when Cowper stoves were used a temperature of 900 C was reached.

Cupola Is Efficient

H. J. Young said that, all said and done, the ordinary cupola, properly operated, was a very efficient furnace, at least for ordinary gray iron, and in most cases a high tapping temperature was not required. He applied similar remarks to balanced air feed.

The exchange paper from the French Association Technique de Fonderie was contributed by Dr. Ballay of Centre d'Information du Nickel and R. Chavy. The title was "Some Observations on Iron and Steel Castings Specially Resistant to Wear." A summary was presented by Dr. A. B. Everest, Mond Nickel Co. Ltd., London. Conclusions of the authors are that the use of alloying elements and heat treatment make possible the production of sorbitic, martensitic, acicular and austenitic structures. By varying the quantity of the carbide, and the structure, one obtains irons varying greatly as to hardness, brittleness, resistance to corrosion and elevated temperatures. When castings have to be hard, machineable and relatively unbrittle, cast steels are stronger. The authors describe a type of self-tempering special steel which has been developed with a view to facilitating the heat treatment of castings of complicated design. Finally, certain of the particular steels or irons mentioned may be used in rod form for building up or hardening castings by means of the electric arc.

At the same session a paper was given by P. A. Russell, chairman of the Technical Council, on "Heat Treatment of Gray Cast Iron for Relief of Internal Stress." Experiments were made with heat treatment in the range 400 to 600 C to ascertain the amount of relief of internal stress and to study the effects on physical properties. The irons studied were all high duty cast irons. It was found that time, weathering and machining had some effect on relief of internal stress, but that really substantial relief could be obtained by only heat treatment, and this began to be effective only above 450 C. Physical tests showed practically no falling off of properties up to 600 C.

Stress Due To Design

C. E. C. Dickinson, president of the Birmingham branch, who presided at the session, said that the main cause of stress could be ascribed to bad design. He agreed the trouble could be largely eliminated by heat treatment at 550 C. H. J. Young, citing the example of a small piston ring, which showed stress or not according to the faces which had been machined, asked if the stress was due mainly to the skin part of the casting. Colin Gresty queried whether it was correct that no stress relief occurred at 400 C as seemed to be indicated by the curve given in the paper. Dr. Everest said that in many cases it was not necessary, for practical purposes, to remove stress; at all events, heat treatment at 400 C was enough to remove 25 per cent of the stress and that was the important part to be removed. Mr. Russell, in reply, said his aim was to satisfy a customer that he was getting real stress relief; he said he did not think the stress was confined exclusively to the skin of the casting.

Other papers presented at the conference were: "The Influence of Raw Material on the Properties of Whiteheart Malleable Cast Iron With Special Reference to the Influence of Residual Elements," by the Malleable (Metal Compositions) Subcommittee of the Technical Advisory Panel to the Director for Iron Castings, Ministry of Supply; "The Annealing Rate in Gaseous Malleablizing," by D. M. Dovey and I. Jenkins, General Electric Co. Ltd.; "Note on the Process of Gaseous Malleablizing With Special Reference to the Use of Steam," by D. M. Dovey, General Electric Co. Ltd.; "Standard Test Bars for the Nonferrous Foundry," by F. Hudson, Mond Nickel Co. Ltd.; "The Production of 'Grand Slam' Bomb Castings," by B. Gray, English Steel Corporation, Ltd.

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The Adventures of BILL

By PAT DWYER
Drawings by RICHEY

SITTING in a pair of rustic chairs one night recently, Bill and I enjoyed the priceless privilege of doing nothing and saying nothing for about an hour. The air was warm and quiet and faintly scented with new mown grass, flowers in the garden and the exhaust from automobiles whizzing by on the street. Dear little birdies chirped and whistled faintly in a halfhearted manner in marked contrast to the violent chorus that breaks out every morning at daylight when presumably they are fighting and squabbling over breakfast.

Every morning a big, fat, saucy cardinal sits on top of a tree near my window and repeats the same monotonous note over and over, more irritating—if that is possible—than the radio commercials. Tossing around on my little couch in the early morning, I sometimes wonder what the blessed St. Francis of Assisi would have done if he had been in my place. Unfortunately *BB* guns were not available in the saint's day. Association of ideas suggests that the world would be a better place if a windy and limited vocabulary plugger was locked in a room with a one-note cardinal until each bored the other to extinction.

This delightful and whimsical fancy was interrupted by Bill.

"Seems to me," he said, "you had a letter that had you on the prongs, or the hooks, or the horns of a dilemma. Kindly correct me if I am mistaken, but you expressed a desire to have what the advertising boys call a reaction on my part. This is as good a time and place as any other. Shoot if you must this old gray head, but cut it short and spread it thin, she said."

"The letter," I said, "is addressed to the *Iron Trade Review*, a title, as you know, that was changed to *Steel* just 16 years ago this very month of July, 1930. The writer says he is a senior in the Commerce School of a certain university which for motives of delicacy I need not mention. As a subject for his thesis he has selected "The Development of The Labor Union in The Foundry Industry."

" 'I would appreciate it,' he says, 'if you would send me a suggested bibliography on this subject and such data and statistics that you might have available. I am particularly interested in the labor development in the east and gray iron foundries (I wonder where he found out that cast iron and gray iron are different materials?) At the present time I am having difficulty in locating specific information. If there is any way that you could help me, I would be very grateful.' "

"Are you kiddin'?" Bill asked, sitting up straight in his chair. "Lemme have a look at that there composition." He examined it closely and then handed it back with the comment that apparently it was genuine, but he was afraid his eyes were beginning to play tricks on him.

"There is nothing the matter with your eyes," I assured him. "There it is in black and white. The question now before the house is what can I tell this young seeker after the light that will not hurt his feelings."

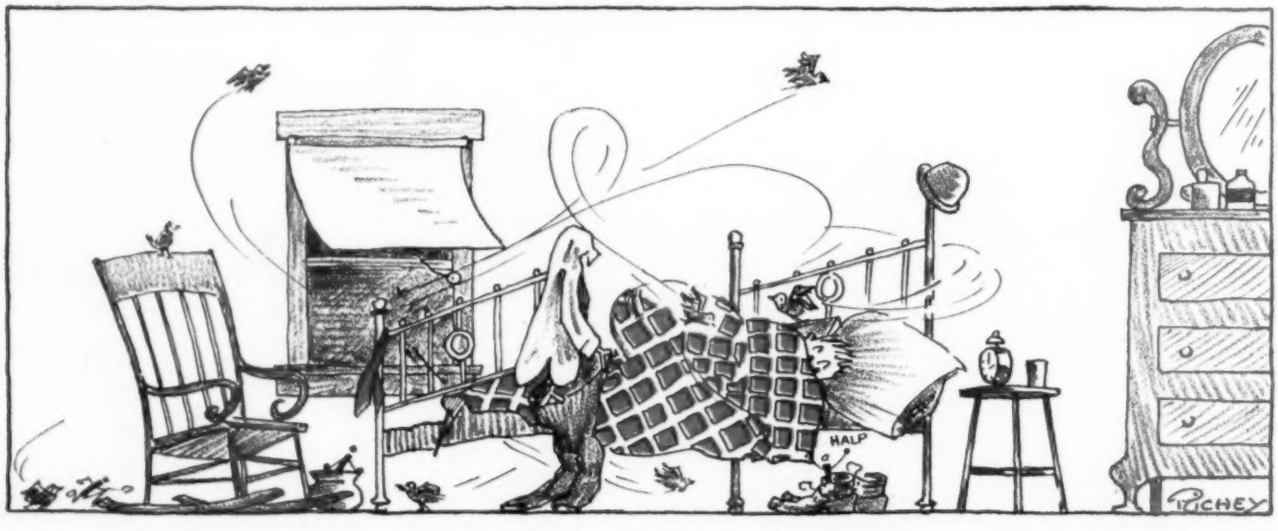
"You don't need to worry about his feelings. A senior who tackles a job about which he knows nothing, must be a tough bird. Adopt the old sergeant technique, the fountain of wisdom, dispenser of the high justice, the middle and the low, do what I tell you, no back talk, chin up and breast bone in and all that there kind of stuff. You may, of course, address him as 'Dear Sir' to kind of stiffen up his morale. Ha! Lemme see." Business here of scratching the head, inserting a fresh chew of tobacco and frowning heavily.

"Dear Sir," says you, "having now reached an age when we can be as crabby as we please while handing out patriarchal gobs of advice and information, we cannot help wondering what possible use your thesis will be to you or any other person."

"You will pardon me for interrupting, but I cannot see the necessity, the expediency or any other reason for dragging in the age reference."

"Just a touch of the old swashbuckling spirit. Every man over fifty likes to parade the fact. He thinks he should have a medal or a plaque or something for his ability to keep a jump or two ahead of the old clothes man, the world, the flesh and the devil, old Father Time and the undertaker for a half century or more. However, that is neither here nor there.

(*Continued on page* 208)



Revises former opinion of cruel king who had 4 and 20 blackbirds baked in a pie—best place for 'em

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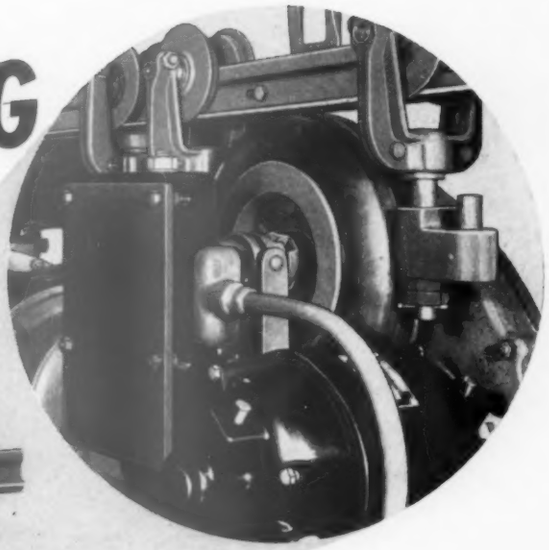
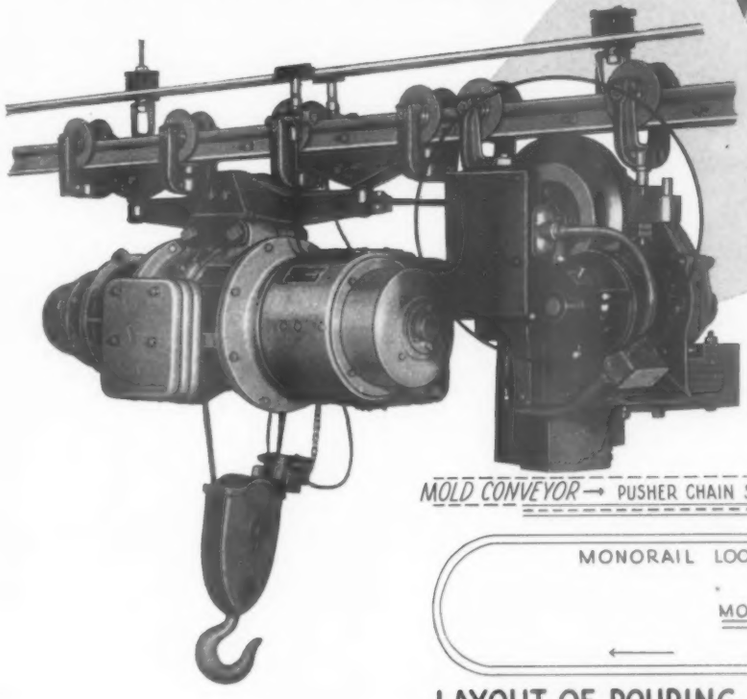
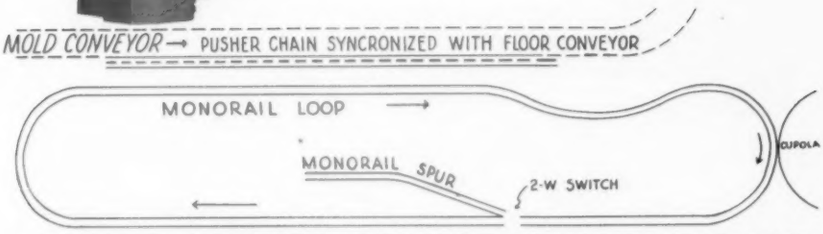
with "Free-Wheeling" AMERICAN MONOTRACTOR







LAYOUT OF POURING LOOP FOR CYLINDER HEAD LINE

Here is another example of American MonoRail engineering with the American MonoTractor.

A rubber drive wheel propels a heavy bull ladle from the cupola to floor conveyor carrying flasks. When the unit reaches the pouring area, clutch disengages the MonoTractor drive wheel so that carrier unit can be picked up by an overhead pusher and moved along over the flasks at the same speed as the floor conveyor.

This enables the operator to concentrate all efforts on pouring. No worry about "keeping up" or "getting behind" the flask—operator forgets about horizontal movement and is able to pour metal faster and more accurately.

This principle is applicable to many conveyor lines for process in motion. Let an American MonoRail Engineer go into further details.

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Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

(*Continued from page* 206)

Just forget about the age and continue with the letter.

"Point out that your correspondent proposes to tackle a subject as vast as the canvas referred to by the late Mr. Kipling—you know the picture painted with a comet's tail and so forth—and here he is with no brush, no tools, no background of knowledge, no experience and apparently without the slightest idea of where to go looking for any of these things. For example he addresses his inquiry to the *Iron Trade Review*. Practically every person in the metalworking industry knows that the venerable old name, in keeping with the trend of the times, was changed to the more appropriate title *Steel* 16 years ago.

"To show him you have a heart of gold instead of a stomach ulcer, as he might suspect from your introduction, you now

More under-the-old-apple-tree stuff

throw him the life line and trust to Providence that he has the wit and strength to catch and hold on to it. Tell him that the subject he has in mind was covered in an intimate, complete and scholarly manner by John P. Frey in a series of 8 articles which appeared consecutively in the *American Federationist* from April to Nov., 1944. Later the series was compiled in book form. The author is president of the Metals Branch of the American Federation of Labor, a deep student and a recognized authority on the subject of labor relations. Before accepting his present position he was editor of the *International Molders' Journal* for many years. Tell your friend to get in touch with Mr. Frey and beg, borrow or buy a copy of the book. Then he can crib enough of the material to carry him over the approaching hurdle.

"If I was in his place I should be

(*Continued on page* 210)

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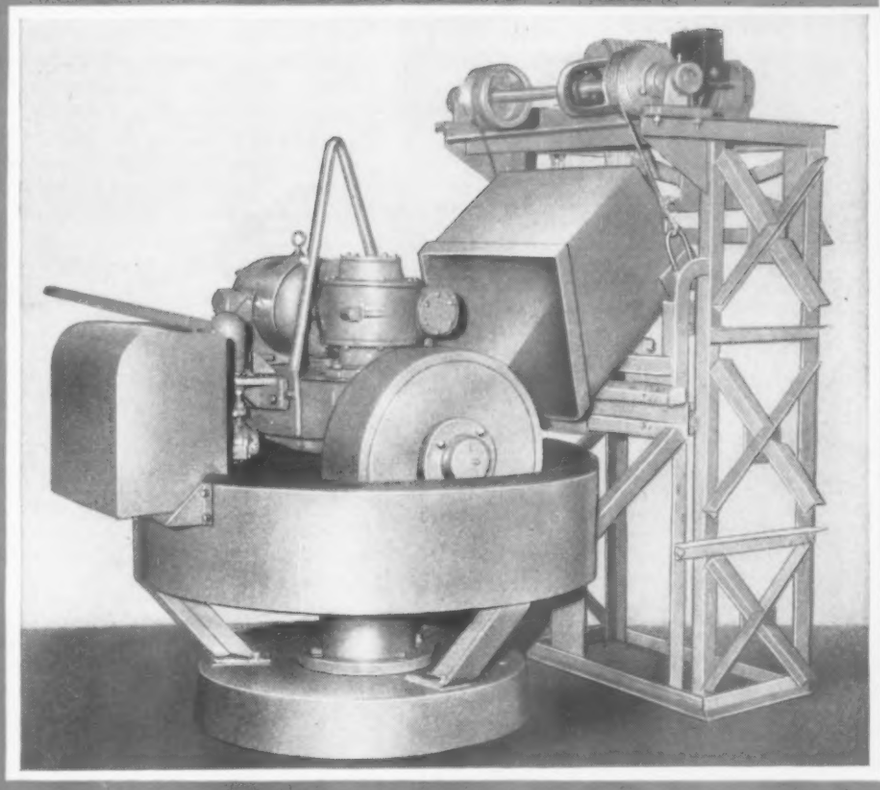
Fast, Complete Sand Preparation



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A Clearfield Bucket Loader speeds up the complete sand preparation of a Clearfield Mixer. The loader deposits a full batch in the mixer and while the sand, bond and moisture are being quickly and thoroughly mixed, the bucket is returned to loading position and refilled. This makes possible almost continuous preparation. There is a Clearfield Bucket Loader designed especially for each of the four sizes of mixers. For complete information write for Catalog No. 77.

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CLEARFIELD
MACHINE COMPANY
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(*Continued from page* 208)

tempted to do a thesis on some other subject, for example 'Where Do We Go From Here' or 'Where Did We Come From' or 'Why Are We Here.' Any one of these would be much easier, and certainly of as much practical benefit, as trying to stumble through the tangled and highly intricate jungle of foundry labor relations, where he does not know where he is going, where he would not recognize pertinent information, and would not know where he had been, if and when he returned to his little downy nest in the university dormitory.

"With that little job completed to the satisfaction of one and all," said Bill, rubbing his hands together to remove imaginary dust and crumbs, and producing a small sheet of paper typewritten on both sides, "here is an inquiry I had some time ago from a man in India who was having a bit of trouble with a job in the foundry, trying to cast a corrugated iron shell on a small steel roll. He writes, 'in attempting to cast a number of corrugated iron rolls 4 ft in length around a steel shaft 2½ in. in diam., we find blow holes in the casting and the ends almost impossible to machine. The corrugated face of the roll is to be used in the as-cast condition. A number of the castings also warped ⅛-in. in the center. The molds were made, dried and poured in a horizontal position. The shafts were pickled and then raised to a red heat in an open fire before they were placed in the molds which were poured as soon thereafter as possible.'

"In my reply," Bill said, "I pointed out that the design of the casting described and illustrated in the letter, a veteran of a 42-day trip halfway around the world, is not really adapted to production in the foundry. Since the face is not machined it seems obvious that the grain surface of the corrugations is not a factor of importance. Therefore the roll could have been made as a one-piece malleable iron or steel casting. Alternatively it could be formed from a steel billet under a hammer in the forge.

"Any time or place that molten metal comes in contact with a steel shaft or other metal insert, a certain amount of gas is developed from the film or oxide scale on the shaft. Where the molten metal is in considerable volume, all or nearly all the gas has a chance to escape before the metal solidifies. It has practically no chance in the corrugated roll where the thickness of metal is only ⅜ in. in the hollows and only 1⅛-in. on the crests.

"In the form of actual rust the oxide film on steel readily may be detected and proper steps may be taken for its removal. However, a point usually overlooked in the foundry is that an oxide film always is in existence, even if only microscopic in thickness and invisible to the naked eye. The shaft may be cleaned by pickling, grinding or sandblasting and then covered with a thin coating of kerosene or gasoline to protect the surface from atmospheric action up to casting time.

"Heating the shaft is commendable practice, principally because it reduces the chilling effect to some extent, and also helps to equalize the shrinkage strains during the cooling period of shaft and casting. In the present instance the heating is detrimental since it keeps the thick shaft heated for a longer time than the thin casting. The cast iron shell cools first, but cannot shrink properly or to normal extent on account of the shaft to which it is now attached. A hard, stiff iron will crack, but a softer iron will stretch a little and remain in tension. Later, the shaft begins to pull, but the rigid cast iron shell will not yield in a straight line. Heating the shaft also introduces a hazardous factor. Raised to a red heat in an open fire, the entire surface becomes covered with an oxide scale which produces a far greater volume of gas than a clean, cold shaft, or even a shaft that actually is damp

(*Concluded on page* 212)

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Chicago, Ill.	Wehenn Abrasive Co.
Cincinnati, Ohio	Delhi Foundry Sand Co.
Coldwater, Mich.	The Foundries Materials Co.
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Los Angeles, Calif.	F. E. Schundler Bentonite Co. (Inc. of California)
Milwaukee, Wis.	Thomas H. Gregg Co.
Minneapolis, Minn.	Smith-Sharpe Co.
Moline, Ill.	Marthens Company
New Orleans, La	Barada & Page, Inc.
Oklahoma City, Okla.	Barada & Page, Inc.
Philadelphia, Pa.	Penna. Fdy. Sup. & Sand Co.
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San Francisco, Calif.	Ind. Fdry. Supply Co.
Seattle, Wash.	Carl F. Miller Co.
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A single valve controls all operations. Only two bearings are used in the squeeze frame, thus eliminating wear and assuring a uniform, even squeeze to all parts of the mold.

The newly designed squeeze head equipped with rubber guards to protect the patterns, can be easily adjusted for different height flasks, and three large wheels permit the machine to be moved quickly over uneven floors. Can we send you a completely descriptive catalog?

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THE JOHNSTON & JENNINGS CO.
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IMPROVED UP-TO-THE-MINUTE MOLDING MACHINES FOR EVERY NEED

(*Concluded from page 210*)

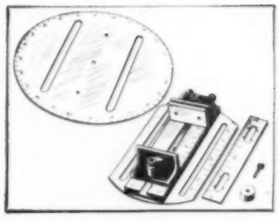
with condensed moisture. Where the shaft is heated to equalize contraction strains, it should be sandblasted before it is placed in the mold.

"Personally I think the job is about as appropriate in the foundry as a cuckoo's egg in the nest of a cow-bird and just about as apt to create trouble. It is one of the jobs in which a man saves money by leaving it alone, or in letting a dear friend and competitor have it.

"In the event that you are stuck with the thing and can't very well get out of the jam, the following method of procedure is suggested: Change the pattern slightly by adding a circular core print to the top end of the pattern, and by adding an inch to the top neck to serve as a sullage head. This may not be necessary. The mold then is made in the usual manner and either skin dried on the floor or dried all the way through in an oven. The shaft also is left in the oven all night. In the morning it is taken out, sandblasted and sprayed or brushed with thin oil or gasoline and then laid in the open mold. The mold is closed and turned up on end and then a bit of technique is borrowed from the pipe makers and the foundrymen who make blacksmith anvils in which a steel plate is fused to cast iron body. A ring core containing the pouring basin and gates is lowered over the projecting end of the steel shaft, until it rests in the special print left for that purpose by the pattern. A gate stick 1 in. in diameter forms a horizontal opening between the bottom neck and the outside of the mold either on the cope or drag side.

"Metal is poured into the basin and allowed to run through the opening at the bottom and into a suitable pig bed. This heats the shaft, burns the oxide film and removes the gas. When the stream through the bottom opening flows quietly the opening is plugged and the mold is filled with metal."

New, Simplified Drill Press Vise, Speeds Up Drilling, Spacing, Milling



Designed to be used with a drill press table having either parallel or radial slots, the New UNI-VISE drill press vise, with guide bar and protractor disc, speeds up and simplifies drilling, layout and spacing work in straight lines, radial or circular. With two movable jaws, vise has universal movement without swinging table or head of drill press to locate exact position of work. Operator thus adjusts work quickly for accurate registration.

Guide Bar facilitates drilling holes in a straight line. With a straight edge and a lineal scale on surface, it registers with lineal scale of vise. Protractor disc, for drilling holes accurately in a circle, has parallel slots registering with parallel slots in base of vise, and a removable means to pivot complete unit on table of drill press.

Accurate work can always best be done by attentive operators. That's why many factories urge workers to chew gum. The chewing action helps relieve monotony—helps keep workers alert, thus aiding them to do a better job with greater ease and safety. And workers can chew Wrigley's Spearmint Gum right on the job—even when hands are busy.

You can get complete information from Spiral Mfg. Corp. 3612-26 N. Kilbourn Ave., Chicago 41, Ill.

AA-93

Instrument Society Conference

First National Instrument Conference and Exhibit, sponsored by the Instrument Society of America, will be held Sept. 16-20, in the William Penn Hotel, Pittsburgh. Short courses in industrial instruments, machine shop, optical, and electrical measurements have been arranged under the chairmanship of R. J. S. Pigott of the Pittsburgh general committee of the Instrument Society, to be given at Carnegie Institute of Technology under direction of Dr. B. R. Teare Jr., head of the electrical engineering department. Those interested should register with the secretary, Instrument Society of America, 1117 Wolfendale St., Pittsburgh 12. Meeting jointly during the same week will be the Instruments and Regulators Division of American Society of Mechanical Engineers, which has arranged for three technical sessions.

Revise Valve Data

Division of Simplified Practice, National Bureau of Standards, Washington 25, recently has issued a revision of simplified practice recommendation R-183-42, Bronze or Brass Valves. It includes a change in title to Brass or Bronze Valves (Gate, Globe, Angle and Check), and an increase in the number of pressure classifications to make it more comprehensive.

Issue Bibliography

American Society of Mechanical Engineers, New York, has published a 547-page book entitled a *Bibliography on Cutting of Metals*, by O. W. Boston, which contains over 4100 references from the years 1864 through 1943. The volume is a companion one to the society's *Manual on Cutting of Metals*. References are listed chronologically with an author and subject index.

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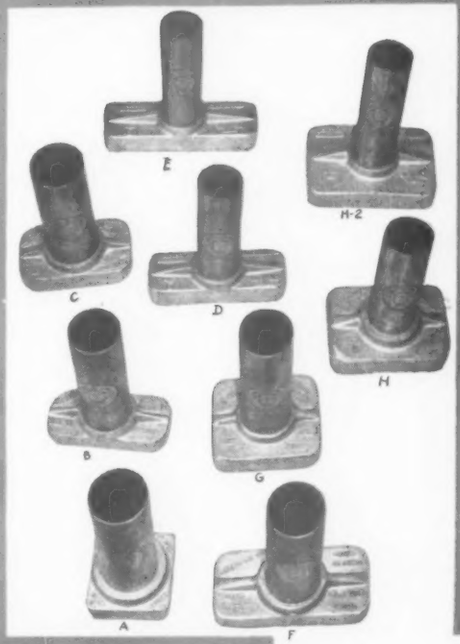
CARTRIDGE BENCH TYPE

FOR EFFICIENT PRODUCTION OF SMALL, INTRICATE CORES



STANDARD SAND CARTRIDGES

The Standard Sand Cartridges are a cast aluminum base into which a seamless steel tubing (2⅝" or 2¾" Dia. x 8" long) is pressed. The bottom of the base is closed with an ⅛" cold rolled steel plate, in which holes are to be drilled to match the blow-holes of the core box.

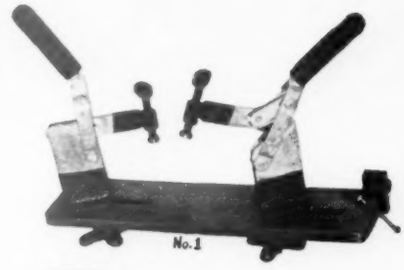
SIZES	WIDTH—LENGTH	PRICE
A	3⅜ x 3⅜	$10.00
B	2¾ x 5⅜	11.00
C*	3 x 5⅜	11.00
D	2¾ x 7⅛	12.00
E	2⅜ x 8⅜	12.00
F	3 x 7⅛	14.00
G	4⅜ x 5⅛	14.00
H	4⅜ x 8⅜	15.00
H2	4⅜ x 7⅛	15.00

To find outside dimensions, add ⅜" to width and length of inside dimension.

Special size Sand Cartridges furnished upon application.

*This size adaptable to a large range of core boxes.

1. Core Box Clamping Attachment for blowing vertically split core boxes. (On end)
2. Core Box Drawing Attachment—used with No. 1 for drawing difficult cores.
3. Vibrator and Knee Valve — air or electric furnished with No. 2.



WHAT USERS SAY

Enclosed check $995.00, which we send with pleasure. We thank you for your interest and print on this core, which was blown perfectly as per your instructions. An additional order is placed for 550 more castings and we will consider the machine paid for.

We purchased a Redford cartridge bench core blower eight months ago and in that time we have saved its cost many times in labor savings.

An experienced core maker is not necessary to operate it efficiently.

It is adaptable to all small work and easy to set up.

The relatively small commission you will make from the sale of this core blower will never free you from the necessity of working like hell to make a living. However, if everything you sell gives the same service and satisfaction that this core blower is giving us, you will inevitably obtain such freedom, but soon.

Being so pleased with our Redford Cartridge Bench Core Blower, we feel that this information should be passed along to you.

The initial investment being so small, it was no time when the blower paid for itself. Production increased tremendously and because of the wide range even short runs are being blown.

*Names of these endorsers furnished upon request

PRODUCES SMALL, INTRICATE CORES WITH REMARKABLE SPEED AND SIMPLICITY

Quickly and economically installed. Does not require a large volume of air—½ c.f.m. is sufficient.

A ¾ inch air line with 80 to 120 lbs. pressure is ample to make cores in single or gang boxes requiring a maximum of 2 lbs. of sand.

To blow core boxes of different height, shape or size, adjustments may be made instantly by the operator.

The Improved REDFORD Core Blower, Cartridge Bench Type, has an arm support column at the rear which provides an air reservoir to give additional volume of air per blow. Blow gun at base of column assures dry air at all times. All condensation in reservoir may be removed when using blow gun.

Sand Cartridges are made a part of the core box equipment. The base of a cartridge is determined by the blowholes in the box. However, one cartridge may be used for several core boxes of approximately the same size. The cylindrical part of the cartridge must be high enough from the base to hold sufficient sand to fill the core box once.

Write for Folder and "Seven Facts" regarding core blowing

REDFORD IRON & EQUIPMENT COMPANY

PHONE: REdford 8610

21315 WEST McNICHOLS ROAD — DETROIT 19, MICHIGAN

ANALYSIS OF THE GRAY IRON CASTING INDUSTRY

(*Concluded from page* 96)

producers, the output of 335 foundries comprises nearly 75 per cent of all gray iron production.

Total shipments of gray iron castings in 1945 amounted to 9,578,295 short tons, 2 per cent under the 9,794,541 tons shipped in 1944. Of the 1945 shipments, 5,923,201 tons, or 62 per cent of the total, were for sale to the trade and 3,655,094 tons, or 38 per cent, were produced for the manufacturers' own use.

Peak shipments for the year were reached in March with 927,925 tons. Although shipments fell off after that month, the declines were more moderate than for most basic metal products. Demand for gray iron castings, as evidenced by orders on the books, was practically as high at the end of last December as it was at its 1945 peak and backlogs were 8 per cent larger than at the end of 1944. Incidentally, unfilled orders so far in 1946 have increased by more than 25 per cent over the year-end figure.

Shipments of molds for heavy steel ingots amounted to 1,810,562 tons, accounting for nearly one-fifth of all gray iron shipments in 1945. An additional 10 per cent of the total—899,561 tons—consisted of chilled iron car wheels. Monthly shipments of these two items declined sharply throughout the year. December deliveries of molds were off 36 per cent and of wheels 39 per cent compared with the March peaks.

During 1945, foundries shipped 602,663 tons of cast iron pressure pipe and fittings and 203,033 tons of cast iron soil pipe and fittings. Shipments of pressure pipe and fittings did not vary greatly during the year, while shipments of soil pipe and fittings, a low priority item during the war but now in great demand for construction work, increased during October and November, but fell off again in December. Deliveries of both types of pipe have recovered rapidly thus far in 1946.

Four States Largest Producers

Although gray iron castings were produced in almost every state last year, four states—Pennsylvania, Ohio, Illinois and Michigan—accounted for more than one-half of all shipments. The largest quantity—1,671,859 tons—was shipped from Pennsylvania foundries; Ohio foundries shipped 1,331,680 tons; Illinois 1,240,224 tons and Michigan 908,674 tons.

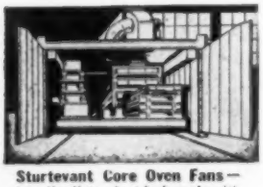
Most of the 1945 shipments of cast iron pressure pipe and soil pipe was produced in Alabama, this state accounting for 374,449 tons of pressure pipe, or 62 per cent of the total, and 109,595 tons of soil pipe, or 54 per cent of the total. Nearly one-half of all molds for heavy steel ingots were produced in Pennsylvania.

The term "gray iron castings" as covered in the report, includes all iron castings, except malleable, but also covers semisteel, alloy iron, and white iron castings. Tonnages given represent the weight of rough castings only, after gates, risers, sprues, etc., have been removed. Foundries were requested to report the casting weights before machining, even if the machining was done in the same plant.

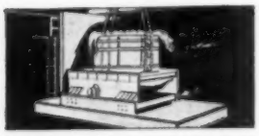
Acid Open Hearth Production Off

Total production of acid open-hearth steel in 1945 was 1,542,724 tons, a decrease of 564,769 tons, or 27 per cent, from 1944, according to the Acid Open Hearth Research Association. Of the 1945 total 746,656 tons was for ingots and 796,068 tons was for castings.

CONSTANT PRESSURE—ALWAYS QUIET



Sturtevant Core Oven Fans—handle dirty, dust-laden air with no loss in efficiency. Shafts cooled by special "heat-slinger."



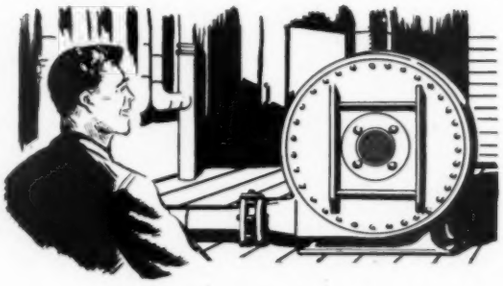
Sturtevant Foundry Shake-out Systems—completely control dust and fumes, increase worker efficiency and equipment life, cut down maintenance.

Sturtevant Cupola Blowers—assure smooth, constant pressure supply of air. Compact, simple, sturdy construction; sizes and types for all conditions.

Sturtevant Dust Control—pioneer experience in engineered systems for collecting dust from snagging, tumbling and sandblasting operations.

Sturtevant Fume Control—efficient tailor-made systems for production foundries or low-operating-cost equipment for jobbing shops.

Sturtevant Compressors Supply Low-Cost Air Blast to Burners



WHETHER YOU BURN oil or gas, you want low-cost, constant pressure of air to insure uniform blast for your burners. And that's what Sturtevant Compressors give you, over a complete volume range, without valves or auxiliary governors. Sturtevant Compressors have no ear-piercing whine or pitch-note. The flow of air is carefully controlled to give a smooth stream from inlet to outlet, free from inlet shock or eddy currents.

If it's lifetime efficiency you want, with minimum down-time for maintenance, and marked power savings in operation, call on the Sturtevant Branch Office nearest you for full details. Or write: B. F. STURTEVANT COMPANY, Division of Westinghouse Electric, Hyde Park, Boston 36, Mass.

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DESIGNED TO MEET YOUR FOUNDRY NEEDS

Sturtevant
Puts Air to Work

B. F. STURTEVANT COMPANY · DIVISION OF
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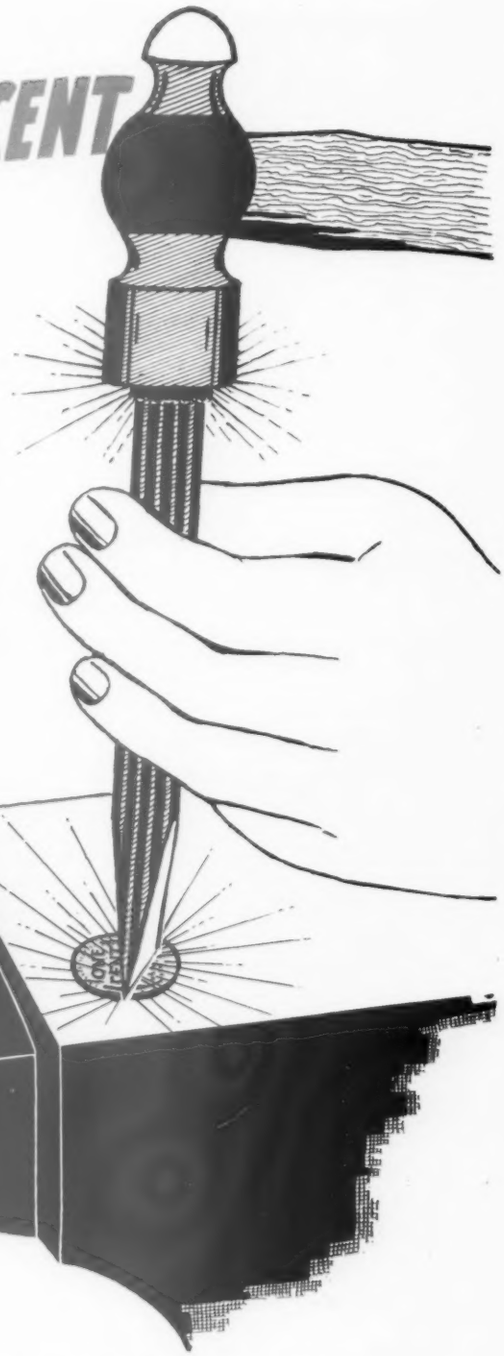
Better Castings for a FRACTION OF A CENT

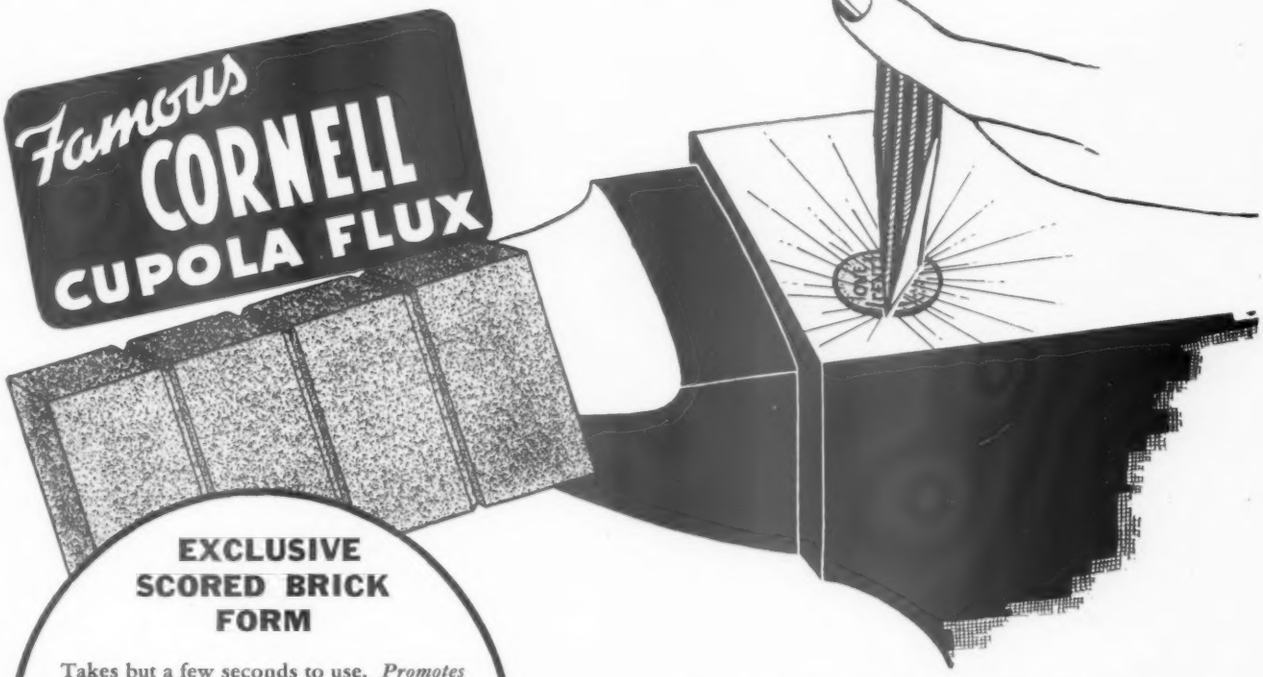
That's all it costs per average size casting when you use Famous Cornell Cupola Flux!



AN AMAZING METAL CLEANSER!

Famous Cornell Cupola Flux makes iron pure and clean, shortens heats, makes iron hotter and more fluid. Makes slag more fluid, too.

When you use Famous Cornell Cupola Flux your castings come denser grained, sounder, stronger, easier to machine. Cupolas are kept clean, life of brick in melting zone is protected—and you always get a CLEAN drop. *Write for new BULLETIN NO. 46-B.*



EXCLUSIVE SCORED BRICK FORM

Takes but a few seconds to use. *Promotes accurate measurement.* You simply toss in one brick or break off a briquette (quarter section) for each 500 pound charge of iron in the cupola. None blows out with the blast—it *stays* in melting zone until *entirely* consumed.

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Famous CORNELL ALUMINUM FLUX	Famous CORNELL BRASS FLUX	Famous CORNELL LADLE FLUX
Produces clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections are poured. Castings take a higher polish. NO FUMES! Exclusive formula prevents obnoxious gases. Metal does not cling to dross.	Makes metal pure and clean, even when dirtiest brass turnings or sweepings are used. Produces castings which withstand high pressure tests and take a beautiful finish. Saves considerable tin and other expensive metals. Crucible and furnace linings are preserved.	Place a few ounces in bottom of ladle, then tap cupola. Metal is thoroughly cleansed, foreign impurities are easily skimmed off. Ladles are kept clean, there is less patching and increased ladle life. Metal temperatures are retained during transfer to molds.

COMPARISON OF PRECISION CASTING METHODS

(*Continued from page* 85)

tne cavity. The molds are then placed in a furnace and slowly raised to casting temperature, which is variable and dependent upon the type of alloy to be cast. For ferrous metals temperatures from 1400-1900 F customarily are employed. This heat not only expands the mold an amount approximately sufficient to overcome the shrinkage of the metal during solidification, but also vaporizes the last traces of expendable pattern material remaining in the mold.

It should be noted that if plastic is employed, the entire pattern elimination occurs in the furnace and primarily is a process of combustion rather than melting. The molds normally are cast quite hot with pressure of some type utilized to force metal into the mold. Ordinary processes include centrifugal casting about an external axis; application of air pressure to the molten metal; or the application of vacuum to the mold.

Under proper conditions and with proper technique, investment casting is truly precision casting since it is quite feasible to maintain tolerances of 0.003-in. in production. If necessary, these tolerances can be reduced substantially by the application of extraordinary care and an increase in the number of rejects.

As with most relatively new processes, there is a great tendency to attempt the application to fields and items properly beyond its current scope. Investment casting has a very definite field of its own which is not truly competitive with other casting procedures. This field probably may be defined by comparing the various advantages and disadvantages of each of the so-called precision casting methods. So far as casting is concerned, in most instances, each item will fall into one of the general casting process groups. Except in borderline cases, an attempt to produce that item by any other process is an uneconomical procedure.

Many Alloys Are Used

The investment casting process offers a practically unlimited range of metals and alloys, greater, perhaps, even than sand casting, together with outstanding control of shape, surface and tolerance. The available control is sufficiently great in most instances to permit the use of investment cast products directly in a machine without secondary operations except for cutting off the sprue and perhaps a buffing operation.

Porosity in properly made investment castings will be either very low or completely absent, and the physical properties of the various alloys are excellent. Ferrous castings have been made by this process with properties equal to forging in substantially all respects except in impact strength, and with some properties substantially better than parts machined from forgings.

Complex coring is not difficult in the investment process except in instances where long, thin, unsupported cores are required. This type of core frequently causes difficulty in the process.

On the debit side of the ledger, however, it must be noted that the cost per pound of casting is extremely high and that the process is limited to the production of relatively small sizes. In many instances, it is not desirable to attempt the production of castings of over ½-lb. net weight by this process, although castings of larger size have been made successfully. Difficulty is experienced in maintaining relatively large flat surfaces, a common difficulty with many other casting processes.

The labor cost per mold in the investment process, also the initial die cost, are quite high. Therefore, the proc-

(*Continued on page* 218)

"THEY *Slip on quickly...* STRIP OFF CLEANLY..."

And here are other reasons foundry men prefer Transite Slip Jackets:

Light weight—Non-metallic, these jackets are easily handled, can usually be carried by one man.

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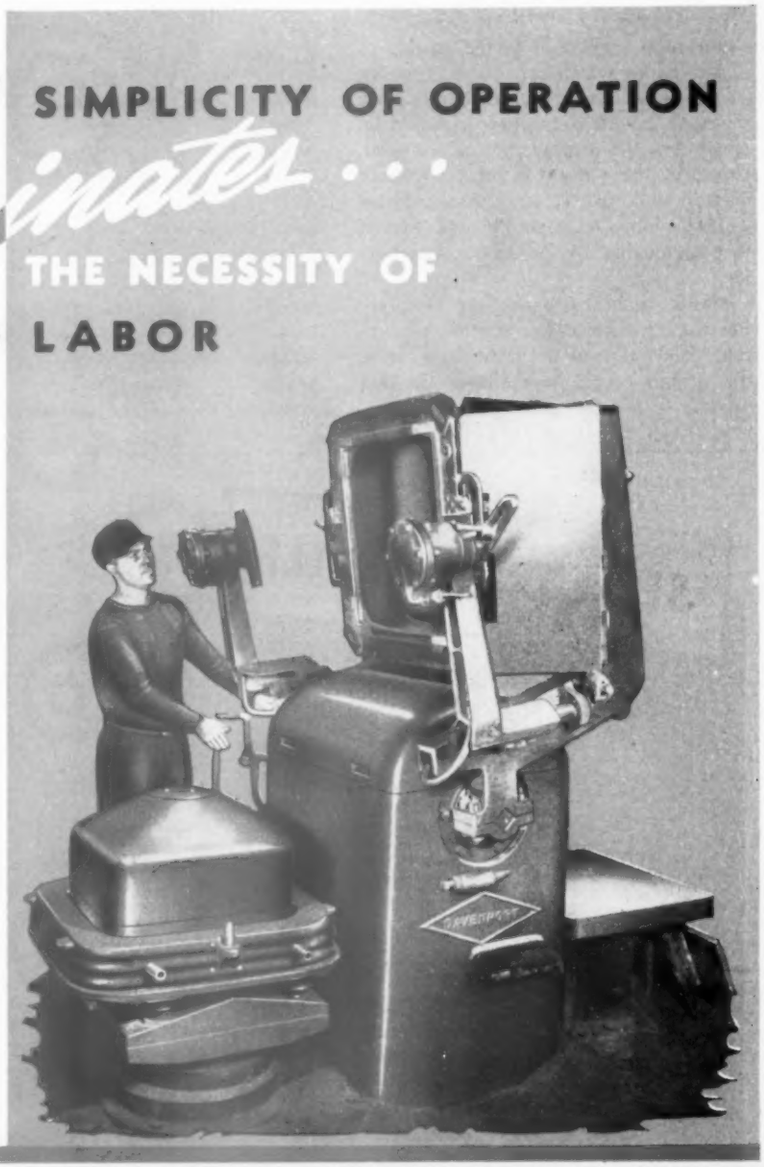
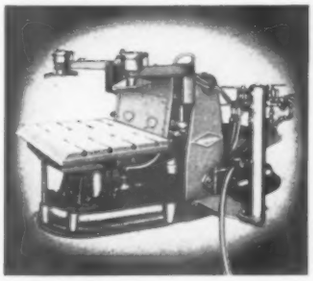
In a few short hours unskilled laborers become efficient operators. Simplicity of operation, with its positive uniform jolt and smooth steady pneumatic hydraulic draw, practically eliminates all patch work.

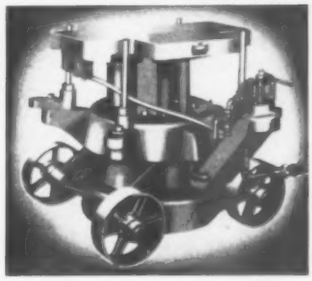
You can increase your production and improve the quality of your castings with "Davenport" Molding Machines.

Let us send you our catalog. Over 60 sizes to meet every requirement.

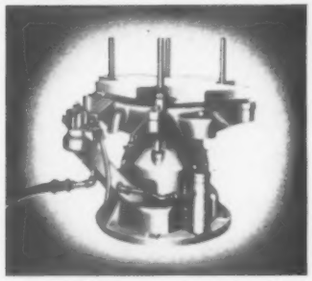




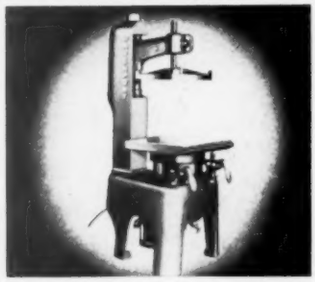
Jolt Rollover Draw Model A



Jolt Pin Lift Model AJS



Jolt Pin Lift Model AJS Stationary



Jolt Squeeze Model 10JX Stationary

DAVENPORT MACHINE AND *Foundry Company*

DAVENPORT IOWA U. S. A.

(*Continued from page* 216)

ess is most applicable to the casting of small shapes which are highly complex or are to be formed of a hard refractory material. In this connection it should be noted that the reproduction of complex curves by this process is not particularly difficult and that in such instances the reproducibility customarily will exceed that obtainable by production machining.

Plaster mold casting offers very attractive characteristics in the nonferrous field and most particularly with the various copper-base alloys. In this process a plaster composition is cast against carefully machined metal match plates to form cope and drag sections. After setting, the mold is removed and all free and combined water driven from the material. Cores are formed by the same process and assembled after drying with the dried cope and drag. The mold then is placed in a casting press and poured by gravity.

Castings made by the plaster mold process have very excellent surface detail and conform closely to shape. Porosity is low and the castings exhibit satisfactory physical characteristics well adapted to conventional heat treating practice. One of the outstanding characteristics of this process is the ability to handle castings requiring complex cores. With the possible exception of the investment casting process, few, if any, casting process can compete successfully with plaster mold castings in this regard.

Initial die or pattern cost is reasonably low and a good range of nonferrous alloys is available to obtain the desired physical properties. While aluminum, magnesium and various other alloys can be cast satisfactorily by this process, it is most outstanding for the results obtained on copper-base alloys. Castings of medium size up to perhaps 18-in. diameter and 5 or 6 in. thick have been cast successfully.

Labor cost per mold in the plaster mold process is relatively high which indicates that the process is not particularly well adapted for large scale production. Tolerance control, while satisfactory in many instances, will not approach that available either by investment casting or die casting. Metals having melting points over 1900 F cannot be cast satisfactorily in plaster molds. This, of course, eliminates steel from consideration. The use of this process appears to be indicated for complex, small or medium-size nonferrous castings in moderate number, particularly if the required core is complex.

Die Casting Process

Advantages and disadvantages of die casting are relatively well known. Briefly, die casting provides means of obtaining excellent surface and tolerance control at low cost if the volume is sufficiently large. Very thin sections can be produced and within the range of alloys applicable to the process, good physicals are available.

The process is not particularly applicable to instances where only a moderate number of castings are required or where physical properties, such as resistance to impact, are of primary importance. Initial die cost is relatively high, size is somewhat limited, and in some instances porosity is quite troublesome, although this often can be eliminated by proper design and process. The most fundamental weakness of the process appears to be the relatively limited range of alloys available.

The permanent mold process of casting employs a coated metal mold poured by gravity. It offers its best characteristics in the nonferrous alloys and can handle medium-sized castings having moderately complex cores at a reasonably low cost. Speed of production and labor requirements per mold are intermediate between die casting and the plaster mold process. Several excellent alloys

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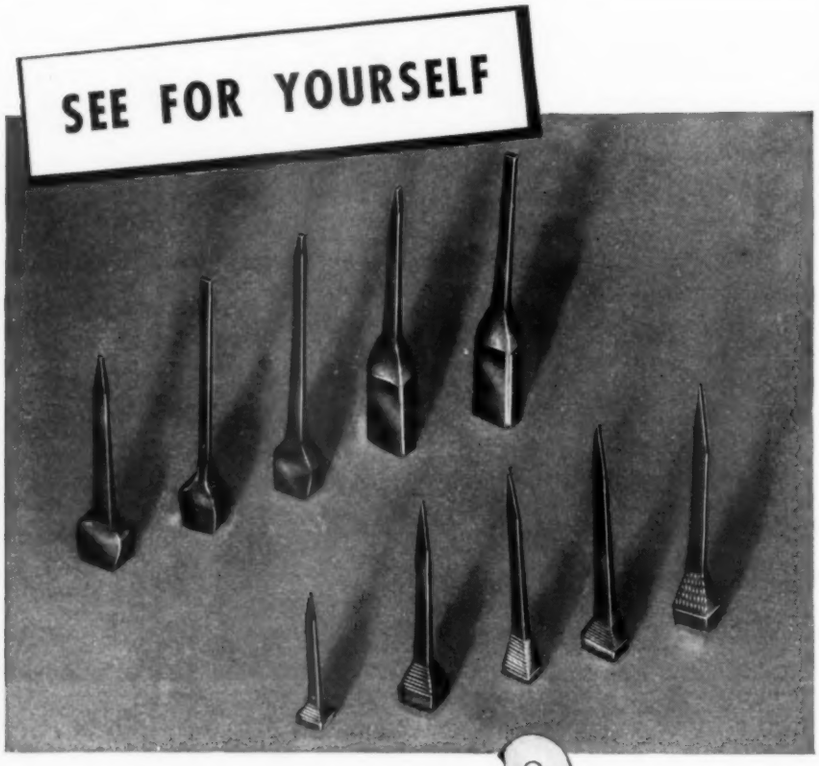

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In Capewell's Moldochil line you secure, at regular prices, the right nails for each job. Sharp points or regular blunt ends; slim, extra slim or regular blades. All fuse fast because they are made of soft iron. For most satisfactory results in casting manufacture, use Capewell Moldochil nails. No obligation when you send for samples, simply write to . . .

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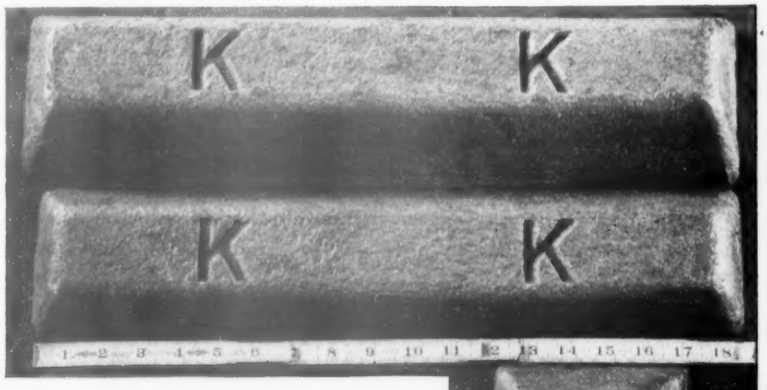

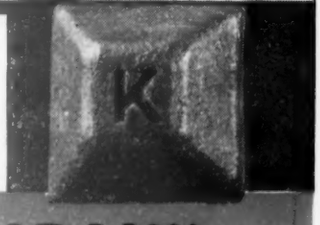

Keokuk Electro-Silvery . . . both standard and alloy . . . 60-lb. pigs for blocking the open hearth heat—30-lb. pigs for charging the cupola—12½-lb piglets (for foundries) so uniform in weight that they can be charged by count. All can be handled by magnet.

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(*Concluded from page* 218)

can be employed and the physical properties obtained from these alloys are very good.

However, the surface finish of the castings, in many instances, is not sufficiently smooth to use as a working surface without secondary machining operations, and some difficulty is experienced with porosity. The control of shape, in most instances, is only fair. In this regard, however, recent advances in the art seem to indicate that much better shape and tolerance control can be expected in the near future. The process seems well adapted to the production of nonferrous castings where relatively large production is required and only moderate tolerance and surface control are necessary.

In this process, as with investment casting, the product varies considerably, depending upon the supplier. An unsatisfactory experience with one supplier should not necessarily preclude the possibility of employing the process, since another supplier may be able to supply the desired characteristics.

Centrifugal casting covers so many potential processes that it is dangerous to attempt to express general advantages and disadvantages. Characteristics of the process vary considerably, depending on the type of mold employed and upon whether the mold is swung about an internal or external axis.

Generally speaking, centrifugal castings exhibit low porosity and a reasonably good external shape control if the casting is revolved about an internal axis. Obviously, some internal machining will be required, although this does not necessarily follow if the piece is swung about an external axis. Both ferrous and nonferrous castings can be made by the process and it is well adapted to production since neither the labor or mold cost is unreasonably high and a reasonable speed of production can be obtained. In most instances, it is difficult to cast pieces requiring cores by an internal axis centrifugal process and often the final surface finish leaves something to be desired. Since the finished surface is dependent on the mold material a steady improvement will be noted along these lines.

It seems superfluous to attempt the inclusion of sand casting in this discussion since it is well known. Familiarity should not breed contempt since various foundries have been producing sand castings which border closely on the precision casting field.

Research Is Important

If the rate at which the Patent Office has been receiving patent applications from American inventors is any indicaton, it is reasonably sure that research is going to be a very important integral part of American industry for some time to come, and there appears to be no valid reason for assuming that the foundry industry will not be included.

Compared to some fields of industry, the foundry in the past has been somewhat backward in carrying on the necessary more or less fundamental research to insure a steady and satisfactory rate of advance. This situation appears to be changing for the better as executives realize research can be employed to increase profit.

Development work in the future very probably will point in the direction of substantially greater precision and better surfaces at lower costs. Whether this will be in the nature of refinements or improvements to reduce the cost of the precision techniques, or in an improvement of tolerance in the casting fields currently offering only relatively low tolerance and surface control, remains to be seen. Regardless of the direction followed, a steadily increasing demand for castings formed to closer tolerances and with better surface finishes seems to be clearly indicated.

Getting a LIFT with a Stearns MAGNET

Assembling this 4000-lb. track would be a tough job without Stearns Lifting Magnets. This is only one of many applications for Stearns magnets that help speed production in busy war plants.

Moving large quantities of material in fast time at low cost—guarding hand labor on difficult and dangerous operations, conveniently, safely and economically.

Increasing storage capacities, loading and unloading are a few of the advantages of using Stearns Lifting Magnets.

Let Stearns magnets give you a lift. We make 'em in many sizes and shapes. Why not consult Stearns Magnetic Milwaukee with your problem.

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662 S. 28th St., Milwaukee 4, Wis.

BRASS FOUNDRY TERMS ITS ROYER "an ideal machine for Sand Conditioning"

Pictured is a Royer Sand Conditioner and Blender at Dearborn Brass Co., Cedar Rapids, Iowa, makers of brass plumbers' goods. This Royer provides the kind of sand required for the production of brass castings with minimum discount. A company official writes:

"We are getting good results and like our Royer very well. We find it an ideal machine for sand conditioning, as well as a time and manpower saver."

Whatever the type of castings produced — ferrous or nonferrous — large or small — the Royer gives the final answer to the sand preparation problem. Over half the 7,400 Royers sold represent repeat orders.

The Royer reduces sand conditioning costs substantially, as the only labor required is shoveling the sand into the hopper. The rugged, trouble-free machine does all the rest: removes all contamination; properly blends the sand, with correct distribution of moisture; effectively aerates and increases permeability; reduces the sand to a smooth, even texture, free of lumps.

Royer-conditioned sand minimizes surface defects, reduces discount losses and provides smoother casting surfaces with lower cleaning room costs.

There is a Royer model, stationary or portable, for every foundry requirement. Write for Bulletin 744.

MANUFACTURER'S ASSOCIATION INC. FOUNDRY EQUIPMENT

ROYER REPAIR SERVICE

We are proud of the records of Royers for long service under foundry conditions. Not long ago two were replaced by new Royers after 20 years.

When a Royer is finally "worn out" we are prepared — with skilled mechanics, genuine repair parts and jig fits — to restore it as good as new.

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

KINGSTON, PENNSYLVANIA

MEDICAL FACILITIES—A FOUNDRY ASSET

(*Continued from page* 81)

Second, we wanted to weed out, before they were hired, men for whom foundry work might be a real hazard.

We wanted to protect both the company and the employees. We agree with the military services who place physical fitness as a No. 1 requisite for a recruit. We have to have men who are able to do a job in a heavy manufacturing industry.

And we say this in spite of the fact that much of the manual labor which is associated in the minds of the outsider with foundries is a thing of the past with Ferro. We don't think of ourselves as a foundry any more, but rather as a concern which manufactures castings. To that end we have installed complete conveyor systems and mechanical devices of one sort and another, which reduce and largely eliminate the back-breaking labor of yesterday.

We also realize that for our own protection and for the protection of employees, we must screen out men who have a tendency toward lung trouble. We can't blind ourselves that silica sand is one of our basic materials and that silica sand can aggravate lung disturbances.

Finally, we know that if our employees are in good condition and physically fit, the morale in our plant is better and our production is improved. Of course this is helpful to the company, but it's also helpful to the employee who is earning a higher rate and taking home more money at the end of the week.

So we believe that it's foolish to make an investment in an employee who later turns out to be undesirable because of some deficiency which we might have caught with intelligent hiring.

This is particularly true because the rate of pay in our industry has been stepped up to a point where we can't afford to be careless. With the labor rate approximating a dollar an hour we must try at least to get employees who will fit into our organization, who like the kind of work we do, and who will become producers in the shortest possible time.

This is perhaps a rather lengthy explanation of why we believed it good business to invest some $20,000 in equipment for a medical department and to obligate ourselves to perhaps $10,000 a year to maintain it.

Selecting the Doctor

Our first step was to secure the services of a skilled doctor. The doctor is an important part of a medical program and his selection cannot be approached casually.

In our case, we wanted a doctor who was thoroughly familiar with lungs and with the diseases to which they are inherent. But in addition to being a skilled and experienced man in his field, we feel that a doctor in an industrial plant must have an unusual personality—one which invites confidence.

He must know how to explain the objectives of the program to employees in nontechnical terms as they visit his office. There are always some doubters who see in such an innovation a plan of management to put across a scheme which might be detrimental to the rank and file. The right doctor will meet this situation and whip it.

As soon as we got the doctor—and incidentally this was no small difficulty because we were still engaged in the Japanese war—we conducted a three-months' survey of existing medical services in industrial plants. We studied layouts, we talked to doctors, we investigated equipment. We took nothing for granted, but made our own checks and formed our own conclusions. At least, if anything goes wrong, it's our fault.

The next question was where was this

AJAX
TAMA-WYATT
ELECTRIC FURNACES
for the ALUMINUM ALLOY
FOUNDRY
AJAX
THE AJAX-Tama-Wyatt Low Frequency Induction Furnaces are now made in small sizes with capacities ranging from 20 to 35 kw.
Their operation is based on the induction principle whereby energy is transmitted to the molten charge without actual contact, through the refractory walls. Only the metal is heated, and therefore, there are no resistors or other parts having a higher temperature than is absolutely necessary for properly melting the charge. A gentle movement of the bath insures uniform temperature and homogeneous mixing of the alloy ingredients. Linings are made of inert refractories which do not contaminate the melt.
These melting machines are delivered with a self-contained completely factory wired control cubicle, including automatic temperature controller.
AJAX ENGINEERING CORPORATION, Trenton 7, N. J.
AJAX INDUCTION MELTING FURNACE
TAMA-WYATT
Associate Companies
AJAX METAL COMPANY, Non Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

department to be located. We were fortunate in that, by decreasing the size of some offices and by rearranging others, we could use a part of the second floor of our office building.

We allocated a corner 18 x 48 ft—approximately 900 sq ft. This was laid out so that the employee would pass, in logical sequence, from one of the five rooms to another.

The first room is a reception room, in which the x-ray technician holds forth. Here, on a specially designed form, she gets the applicant's identification, his work and his health history. From his employment application she knows the job which he expects to hold and her questions are pointed in that direction.

After she has finished, the written record goes with the applicant to the examining room. Here he meets the doctor who goes over the worksheet.

The applicant now strips and is given a complete physical examination. Included are examination of nose, ears, mouth, heart, blood pressure, and a urinalysis.

The applicant then dresses except for his shirt and goes to the x-ray room. Here he is given an eye examination and then his chest is thoroughly x-rayed.

Provide Checking Program

If the physical examination indicates no apparent troubles, the man is provisionally hired, told to report to work the next morning. He is told that the final decision must await an examination of the x-ray negatives.

It is the plan of the company that every individual on the payroll, from the president down, will be x-rayed as rapidly as possible and that a loose schedule will be set up for future checks. The schedule must be loose because the x-rays may reveal that some men should be checked every three to six months, while in cases where there is no indication whatsoever of any problem, a much longer interval may be used.

I want to make it clear that this health program is entirely separate from our normal dispensary first-aid emergency work, though our doctor has general supervision over this program as well.

We do plan, however, that in case of minor accidents in which a fracture may be involved, the employee will be x-rayed immediately in our own department. Major accidents or injuries requiring surgical treatment are sent directly to a nearby hospital for care.

The figures which I have given for the installation and the maintenance of this program may seem rather sizable. Ferro is not the biggest foundry in the country by a long ways. We have been employing some 1500 people. During the war we reached a peak of 2000 and we expect to have a peacetime peak of about 2400. It costs us, therefore, approximately $10 per employee, based on peak employment, to install our service and it will cost about $5 per year per employee to operate it.

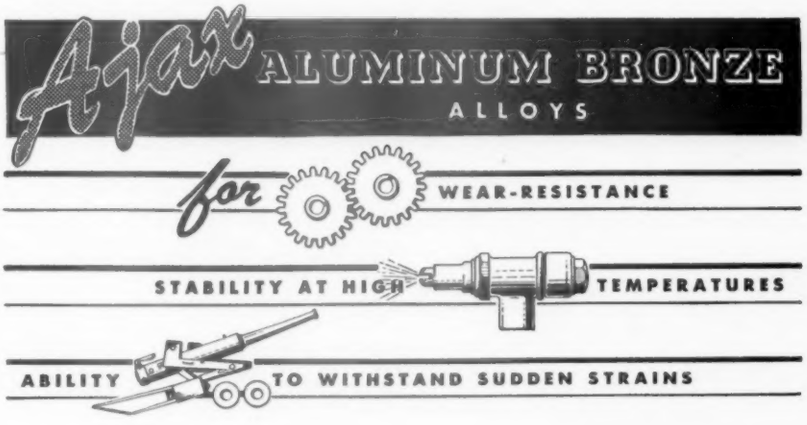
However, during the first month of our operation we found three applicants with definite evidence of recent pulmonary tuberculosis, and one who showed simple silicosis—the last man we would have hired had we not had our health program. He was experienced and fully capable of stepping into a job on our production line.

It does not take many cases of this sort to make us realize that the program as outlined here will be well worth while.

We definitely feel that from the viewpoint of our employees, both prospective and present, the medical service is a great asset.

Our examination, as has been indicated, already has and will continue to keep men from working in our plant who might be seriously harmed by taking a job in a foundry.

Furthermore, through our x-rays we will frequently be able to warn applicants of possible respiratory troubles and



Investigation of Aluminum Bronze Alloys is warranted by foundrymen and designers where metal parts are subjected to either recurrent stresses or compressive forces and resistance to fatigue is sought; where the ability to withstand high temperatures or, where a high degree of corrosion resistance to many chemicals may be a significant factor in material selection. Supplied by Ajax in alloyed compositions of copper, aluminum and iron, as well as special alloys containing nickel and manganese, a complete selection of Aluminum Bronzes is available to meet all existing specifications as listed by Non-Ferrous Ingot Metals Institute, ASTM and the Federal Government.

Ajax, in adhering to its policy pioneered in the very infancy of the non-ferrous metal industry, exercises the closest scientific control over the production of these alloys. Metal men may look to Ajax with continued confidence not only for supply of highest quality Aluminum Alloy ingots, but also for practical technical know-how on correct foundry practice for producing better castings with fewer rejects. Request booklet "Ingot Metals of Today".

Standard Ajax Metals

Ajax Tombasil
Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
Ajax Red Brass Ingots
Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax Nickel-Copper 50-50%
Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

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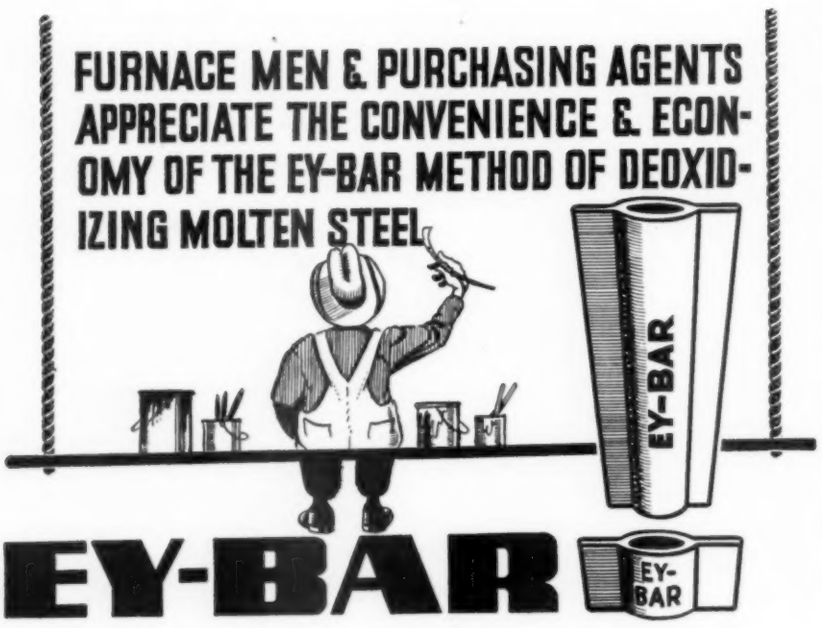
ASSOCIATE COMPANIES
AJAX ELECTRIC CO. ● AJAX ELECTROTHERMIC CORP. ● AJAX ELECTRIC FURNACE CO. ● AJAX ENGINEERING CO.

FURNACE MEN & PURCHASING AGENTS APPRECIATE THE CONVENIENCE & ECONOMY OF THE EY-BAR METHOD OF DEOXIDIZING MOLTEN STEEL



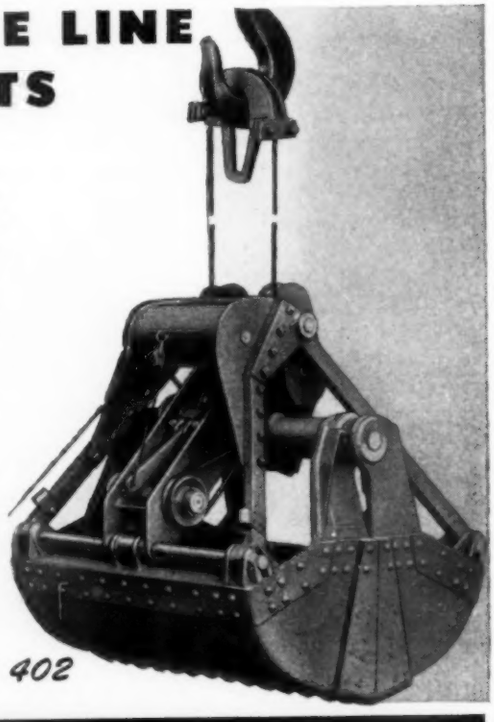
EY-BAR

EY-BAR is a scientifically designed casting of a metallurgical grade of aluminum. EY-BARS come in various grades, and their proportions are such that they will melt evenly and quickly, regardless of size. Made with standard tapered holes, they can be wedged on the end of a long steel bar and immersed in the melt in furnace, ladle or stream. They enable the furnace man to control exactly the amount of effective aluminum he wishes to add to his melt. They come in any size from 1 to 30 lbs, and from Grade I to Grade IV.

Member Aluminum Research Institute

THE CLEVELAND ELECTRO METALS COMPANY
2391 W. 38th ST., MELROSE 5435, CLEVELAND, OHIO

ERIE SINGLE LINE BUCKETS



ILLUSTRATED is the hook-on type, for intermittent service. It is reeved and ready for operation on overhead traveling crane, monorail hoist, locomotive crane, derrick, ships tackle or any other hoisting device which has but a single hoisting drum available for bucket duty. Just slip the yoke over the crane hook.

Erie Single Line buckets are also available in the direct-reeved type for permanent installation. Describe your Single Line bucket need — we'll give you our recommendations for we build all types and sizes.

● *Write for Booklet 402*

ERIE BUCKETS • *A Complete Line*

Erie Steel Construction Co., 1068 Geist Rd., Erie, Pa.

BUCKETS • AGGREMETERS • PORTABLE CONCRETE PLANTS

refer them to doctors for attention. This may mean the saving of many potential tuberculosis victims. Our program may well be considered a part of the great national antituberculosis campaign which is being carried on.

Finally, with such a program, the general health of our entire organization will be greatly improved over a period of time. This will certainly be reflected in better morale and improved work records.

Producing Cast Iron Rolls

(*Continued from page* 93)

80 per cent castings from the heat. Scrap castings reduce this yield by approximately 5 per cent. With small rolls, the percentages for heads and sprues may rise to 30 per cent.

In the furnace, the charge usually melts down in 5 hours. The bath then is stirred vigorously with green wood poles inserted through small side doors. Each pole is about 6 in. in diameter and 12 ft long. The end of the pole is forced to the bottom of the bath to produce a vigorous action which also brings up any cold metal on the bottom. Poling is continued for about 3 minutes, after which the bath is moved around by using the pole as an oar.

At this stage, the first chill test is taken by withdrawing a small quantity of iron in an iron spoon at the end of a long handle inserted through a side door. The test mold is made in green sand and is 1½ in. wide, 4 to 5 in. long and 4 to 5 in. deep. The bottom of the test mold is a cast iron block 3 in. thick, 4 in. wide and 6 in. long. If the metal is too hot, it is allowed to cool to casting temperature, 2450 to 2500 F, before it is poured. The test block is covered with dry sand and allowed to cool for 10 minutes. Then it is taken out of the mold and cooled rapidly by plunging it into cold water several times. Sufficient time is allowed between immersions to permit the test block to become dry.

The test piece then is broken approximately in the center. One part is examined visually by the metallurgist to note the depth of chill. The other part is taken to the laboratory for chemical analysis. Reading and interpreting the depth of chill is one of the most important features in the entire cycle of operation. Also, in common with several other features, it is a form of knowledge which can be acquired only through

(*Continued on page* 226)

MINCO BOND

STEEL CASTINGS FREE OF BURN-IN, FUSION AND METAL PENETRATION WITH MINCO BOND

In the largest steel plant in the world MINCO BOND is given the credit for attaining relief from the three big problems, which have confronted the steel founder from the beginning of recorded time in steel practice to the present day, namely, "BURN-IN", "FUSION OF SAND WITH METAL" and "METAL PENETRATION".

This goal is attained by the development of a sand that will not alter the size or shape of the mold cavity thru the expansion or contraction of the sand grains at pouring temperatures, a high degree of collapsibility and permeability, sufficient green strength to make the mold, and sufficient dry strength to take the blow of the metal. This, they have done, thru the use of MINCO BOND, which imparts to their molding sands these desirable characteristics.

With the increase in collapsibility and permeability, they are able to add more fines to their sands, thereby producing a casting with a smoother finish.

Due to the increase in permeability the moisture content of their sands is no longer a problem. Heretofore, they used a lower moisture content due to the lower permeability of their sands. Drawing the pattern without tearing the mold took considerable skill and patching the mold was difficult. This undesirable condition has been eliminated by using MINCO BOND in their sands with a higher moisture content. They found that a moisture content of 7% to 8% did not have any detrimental effects on the quality of the castings produced in green sand molding when MINCO BOND was used. Consequently, they are now able to use a facing sand with a moisture content of 5% to 6% for green, skin dry and dry sand molding. With this development, confusion has been eliminated on adjacent floors where different sand mixes have been used heretofore.

The expansion and contraction of sand grains at pouring temperatures are the primary causes of fusion and burn-in. A thin skin is formed instantly upon pouring into a mold and the skin thickness does not grow in thickness any appreciable degree until the molten metal in the mold begins to cool. In this short period of time, the heat has been conducted thru the skin causing the sand grains to expand thus shrinking the size and altering the shape of the mold cavity. This action breaks the skin allowing the molten metal to run free with the sand which results in fusion and burn-in. Although MINCO BOND does not alter in size at pouring temperatures, their crude sands do. To counteract this expansion of their crude sands, they added cereal binder in sufficient quantity to burn off allowing adequate room for expansion. This eliminated fusion and burn-in around small fillets and deep pockets.

The castings made with MINCO BOND are shaking free from the sand with a smoother surface. RESULT—lower cleaning cost and better delivery of product.

STEEL GREEN SAND AND DRY SAND FACING:

Large Castings:

800 lbs. crude silica sand — 200 lbs. silica flour
34 lbs. MINCO BOND — 17 lbs Western Bentonite
10 lbs. Cereal Binder

Use 5% to 6% moisture.

Small castings, the same, only wood flour can be used.

Note:—It usually takes many hours to make large green sand molds. Sometimes a green sand mold is made one day and poured the next, causing the high moisture in this green sand facings. Where green sand molds are made and poured within a few hours, carry moisture at approximately 3%.

Write for our booklet.

MINCO PRODUCTS CORPORATION

SAGINAW, MICHIGAN

WARNER A. THOMPSON CO. 7328 Hamilton Ave., Detroit, Mich.
THE BUCKEYE PRODUCTS CO. 7020-34 Vine St., Cincinnati, Ohio
MARTHENS COMPANY 1205-4th Ave., Moline Ill.
FOUNDRY SUPPLIES CO. 461 W. 33rd St., Chicago, Ill.
THE HOFFMAN FOUNDRY SUPPLY CO. 1193 Main, Cleveland, Ohio
THE FOUNDRY SUPPLY CO., INC. 2295 University Ave., St. Paul, Minnesota
WOLVERINE FOUNDRY SUPPLY CO. 3213 Bellevue, Detroit, Mich.
WM. R. BARNES COMPANY, Ltd., 243 Cumberland Ave., Hamilton, Ont.
MOLDEN Ltd., 301 Murray St., Montreal, Quebec
SHANAHAN'S LIMITED, Vancouver, British Columbia
SHANAHAN'S LIMITED, Winnipeg, Manitoba
INDUSTRIAL FOUNDRY SUPPLY CO., Inc., San Francisco, Calif.
INTERSTATE SUPPLY & EQUIPMENT CO. 647 W. Virginia St., Milwaukee, Wisconsin
INDEPENDENT FOUNDRY SUPPLY CO. 2325 East 38th St., Los Angeles, Calif.
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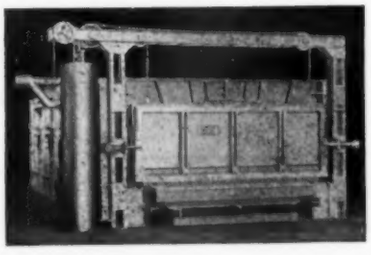
★HANDY? You bet!

In your foundry, a time and work saver.
Handy for repairing surface defects—dries faster, sets harder. Try it!

Shelton Metallic Filler
Send for a liberal sample

PRODUCT OF
AMERICAN CRUCIBLE COMPANY
SHELTON, CONN.

JOHNSTON
CAR BOTTOM
FURNACES



Single chamber, single end model shown.

—for normalizing and annealing castings. Clean heating, high efficiency and fuel economy is attained by the JOHNSTON "Reverse Blast" Low Pressure Burners used on this furnace.

Write for Bulletin F-240

THE JOHNSTON LINE — SAFETY — DEPENDABILITY
JOHNSTON MANUFACTURING CO.
2825 EAST HENNEPIN AVE.
MINNEAPOLIS 13, MINN.
ENGINEERS & MANUFACTURERS OF INDUSTRIAL HEATING EQUIPMENT

(*Continued from page* 224)

close application and long practical experience. Although it is a guide, the depth of chill does not always coincide with the depth anticipated from the chemical content. Variations in the quality of the raw materials, melting conditions and furnace operation affect the chill depth. What is still more important, these factors exert a bearing on the relation between the depth of chill in the test block and the depth which will appear in the roll where the great thickness of metal affects the crystal formation.

Roll foundrymen are divided into two schools on the proper method of reading chill tests. One reads the total depth to the first decided gray iron mottle and divides this by two to determine the depth of chill which will appear in the roll. The second group observes a change in the physical structure or a change in the direction of the crystals, a point about halfway to the first mottle. Either of these features is impossible to describe and cannot be seen with certainty by any person lacking considerable operating experience. The second method is considered the more accurate and is favored by the majority of rollmakers.

Increase Chill Depth

As a result of long experience, the first test usually shows that the iron has the desired composition. Where the depth of chill corresponds to what should be present with iron of that composition, and slightly less than desired, the bath is stirred again. A second test then is taken. The second poling reduces the silicon, manganese and carbon to some extent and thus increases the depth of chill to appear in the roll.

If the preliminary test shows that the chill is too light to be increased by poling, other methods may be adopted. The silicon, manganese and carbon may be reduced by the addition of from 1 to 2 per cent white iron. Chill depth also may be increased by raising the sulphur content. Where iron pyrites are used, 40 per cent of the sulphur contained usually is obtained. Where only a trifling increase in the chill is desired, the pyrites may be added to the stream flowing into the ladle.

Where the preliminary test shows that the chill is too deep, it may be reduced by furnace addition of high silicon pig iron, ferrosilicon, or ferromanganese, depending on which element is low as shown by analysis. Slight changes may be effected by adding ferrosilicon or ferromanganese, or both, to the stream.

When the chill depth, temperature and composition of the iron meet the desired points, the metal is tapped into a

(*Continued on page* 228)

VELSICOL

LIGHT-COLOR

CORESIN OILS

7 point superiority

UNIFORMITY—insured by rigid laboratory control

WORKABILITY—exceptionally clean in core blowing machines

FAST BAKING—no overbaking—stable after polymerization

LOW GAS EVOLUTION—eliminates blow holes

COLLAPSIBILITY—fast, easy shakeout—low cleaning room costs

ECONOMY—reduces amount of oil required in mix

EFFICIENCY-assured by specially synthesized hydrocarbon resin

Your own tests will prove that VELSICOL light-color Coresin Oils offer greater economy—are geared to greater castings production in your foundry.

A generous trial sample and complete information as applied to your particular problem are yours without obligation.

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Manufacturers of Coresin Core Oils • Aromatic Solvents • Synthetic Resins • Insecticides

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PORBECK DRAWER TYPE OVENS

GAS OR OIL FIRED WITH RECIRCULATING AIR HEATERS

UNIFORM CORES CONTINUOUSLY WITH LOW COST OPERATION

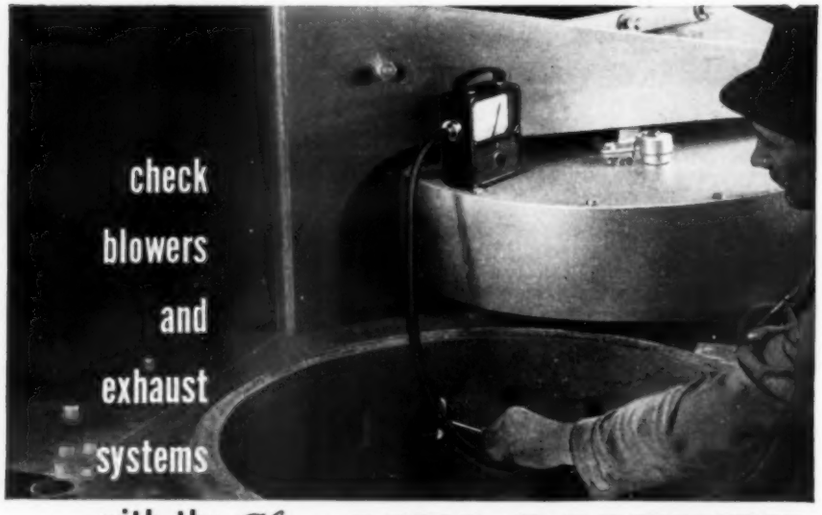
Strictly a *production* unit—note that all drawers operate independently of each other. Comes completely equipped with latest type temperature indicating controls (variable 100° to 650° F) and high efficiency recirculating air heater. Sturdy construction with 4-1/2" fibre-glass insulation throughout. Users commend Porbeck ovens for their space and time saving features. Available in several types and sizes. We invite your inquiry.

WRITE FOR NEW CORE OVEN BULLETIN "F"

PORBECK MANUFACTURING CO.

Manufacturers since 1894 of Core Ovens, Mold Dryers, Processing Ovens, Mold Drying Ovens, Heat Treating Ovens, and Paint Baking Ovens.

2600 N. Ninth St. **St. Louis 6, Missouri**



with the *Alnor* VELOMETER

Air velocity can be measured directly and quickly with the Alnor Velometer. This convenient instrument gives you instantaneous direct readings in feet per minute, a reliable check of exhaust system operation. Extension jets permit use in ducts and many other places inaccessible by other means.

The Alnor Velometer is built in several standard ranges, 0-200 to 0-6000 fpm, and up to 20 inches static or total pressure. Special ranges available up to 24,000 fpm. Write for velometer bulletin with complete description.

ILLINOIS TESTING LABORATORIES, INC. • 420 N. La Salle Street, Chicago 10, Illinois

(*Continued from page* 226)

ladle suspended in a pit. The slag is skimmed from the top and the metal is held in the ladle until it approaches the proper casting temperature as indicated by optical pyrometer. For sheet and tin mill rolls, this is between 2425 and 2435 F.

Roll castings always are poured in a vertical position. Chilled rolls and plain rolls are molded in an upright position. Grooved rolls are molded horizontally, but in both cases the molds are assembled vertically and poured in that position. The sprue or runner for a chilled roll is made separately and attached to the outside of the mold where the opening in the curved bottom coincides with a similar opening or gate in the flask below the chill. Runners and gates vary with size and weight of the casting.

For example, the runner on a 10,000-lb casting is 4 in. in diameter. The gate entering the neck of the mold in the drag is reduced to 2½ in. diameter or to an oval 1 x 3 in. The gate enters the neck about 6 in. below the fillet and is set at a tangent so that the metal acquires a whirlpool motion as it rises in the mold. This whirling motion has a tendency to hold any dross or foreign matter in the center where eventually it is carried up into the riser or sinkhead. The lateral movement also prevents the formation of wrinkles on the surface of the casting in contact with the chill.

Wabblers Cast to Size

On exceptionally long rolls, a ring gate is used with four small tangential gates leading into the drag neck. Except in unusual instances, the wabblers top and bottom are cast to size. The customary finish is allowed on the necks. The usual contraction is provided on all parts of the pattern except the upper neck. This part is molded approximately ½-in. short since this part of the casting lengthens or stretches to that extent.

Heavy cast iron chills form the walls of the mold. Thickness of the chills vary according to the diameter of the roll. Chills are machined on the inside to the diameter of the roll, plus the contraction plus finish allowance. For example, for a 28-in. diameter roll, the chills are bored to 28⅞-in. diameter. In some instances the chill sections are located on top of each other by pins and lugs on the outside. In others they are located by shallow, concentric male and female joints. Where an existing chill is longer than the body required on the roll, part of the upper neck is molded in sand inside the chill.

Roll chills are cleaned with a wire brush or sandblast the day before they are needed. Then they are heated in an

(*Continued on page* 230)

Model 360 Series in wheel capacities from 4" to 8".

PLENTY RUGGED

For Tough, Continuous Foundry Grinding

Thor

PNEUMATIC GRINDERS

On the heaviest, toughest snagging and general grinding, Thor Pneumatic Grinders have tremendous capacity for large daily output. The most powerful tools of their size and weight, Thor Grinders have the sturdiness to withstand the hardest punishment. Thor's "*Air Behind the Blades*" principle assures instant starting and an abundance of steady power. A solid, one-piece rotor boosts the power, double-acting Thor safety governor regulates spindle speed, for highest grinding efficiency.

All features contribute to time-saving on the toughest grinding jobs. Prove it to yourself by arranging a demonstration. Write today!

INDEPENDENT PNEUMATIC TOOL COMPANY
600 W. Jackson Boulevard, Chicago 6, Illinois

Birmingham	Boston	Buffalo	Cleveland	Detroit	Los Angeles
Milwaukee	New York	Philadelphia		Pittsburgh	St. Louis
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3 THROTTLE TYPES

Straight Throttle—*for continuous operation. Tool stops only when valve is manually closed. Widely used on grinders up to 4" capacity.*

Lever Throttle—*instant power cut-off when lever is released. Automatic action makes this throttle preferred on hazardous operations.*

Grip Throttle—*has self-closing trigger for automatic power shut-off. Most popular for grinders of 6" wheel capacity and larger.*

Thor **PORTABLE POWER TOOLS**

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS.

PRODUCTION • MECHANIZATION • OPERATIONS • MANAGEMENT

Consulting and Engineering Service

From the Design of the Foundry to the Shipment of the Finished Castings

A Complete Cost Production and Profit Analysis.

- Plant Design and Layout
- Modernization
- Mechanization
- Centrifugal Castings
- Metallurgical Control and Standardization
- Methods for Increasing Production and Reducing Costs
- Foundry Management Counsellors

STANDARDS—INCENTIVES—METHODS—EVALUATION.

W. G. REICHERT ENGINEERING CO.

1060 Broad St., (Industrial Bldg.) • Newark (2) New Jersey

NEW HEAVY-DUTY CART

Here's just the cart you need for wheeling *coal, scrap, chips, turnings, borings* and similar heavy materials. All-steel, completely welded and reinforced. Made extra strong and rugged for heavy duty service. Dumps easily. Rests securely in any one of the three positions shown here. Available with roller bearings, if desired.

Write for Circular No. 50.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

(*Continued from page* 228)

oven to approximately 400 F. The following morning they are cleaned again and blacked while hot, either with a brush or pneumatic spray. The blacking material is made up of pulverized beehive coke 90 per cent and clay 10 per cent. Instead of attempting to make up blacking mixtures, rollmakers prefer to use a special, proprietary blacking. If in dry powder form, it is mixed with molasses water to the consistency of thin cream.

A machined iron plate on the floor supports the pattern for the neck and wabbler. The pattern is centered on the plate where suitable guides on the edge locate the flask concentric with the pattern. Each ramming plate may be used under several size patterns and flasks. A strong natural loam sand is employed. After the mold section is removed from the plate it is rolled over, finished, blacked and placed in the oven. The following day the molds are assembled either on the floor, for the short ones, or in the pits for the long ones.

Describes Pouring Method

In pouring a roll, a small stream is allowed to flow until the metal has risen to a point a few inches above the gate in the neck. The ladle then is tipped rapidly to fill the pouring basin and keep it filled until the metal shows in the cope neck. Pouring from the ladle then is stopped, since there is enough metal in the pouring basin to force the metal in the roll upward into the sinkhead for a distance of several inches. Later the sinkhead is filled from the top to the desired depth. Depending on the size, the roll is allowed to remain in the mold for from 24 to 72 hours. Then it is shaken out, cleaned and taken to the roll turning shop for sinkhead removal.

Sand rolls in which the passes are roughly outlined, are molded horizontally by sweeps attached to spindles resting in journals at each end of half flasks. The journal at the closed end of the flask is permanent, while the journal at the open end of the flask is on a plate or board bolted in place temporarily. The sweep is turned by a crank handle attached to one end of the spindle. In some instances, projections on the face of the sweep form grooves for the reception of cast iron condensing rings. Each ring is in four parts or quadrants of a circle, two in the cope and two in the drag. They are supported by the sand strip at the joint of the flask and by wires attached to staples in the rings and then drawn through holes in the flask and anchored on the outside. Metal thickness of the condensing rings varies according to the composition of the roll and the purpose for which it is intended.

(*Concluded on page* 232)

BUT ALWAYS UNDER CONTROL

Like a tornado, McKee Centrifugal Pressure Blowers and Boosters have power — needed power for boosting weak gas main pressures and supplying air for proper combustion in gas and oil burners. Unlike a tornado, however, the power from McKee Blowers and Boosters is controlled, assuring constant, steady pressures from 2 ounces to 2 pounds. When constant pressure is essential, McKee Blowers and Boosters produce economical . . . efficient . . . and satisfying results. Write for instructive bulletins K-100 and K-110.

Eclipse Fuel Engineering Company
ROCKFORD ILLINOIS

McKee Eclipse

Write for Our New Catalog No. 58

KRANE KAR speeds up handling of scrap. A foundry user says, "**KRANE KAR** can unload 50 to 55 tons of pig iron and malleable scrap in 3 hours . . ." Steps up unloading from gondola cars into storage piles and bins, and loading of scale cars and charging buckets. Lifts and transports flasks, patterns, sand moulds, and castings with magnet, hook, or bucket. Magnet also handles skull-crackers. **KRANE KAR** may be operated by any man. Ask our nearest agent how to prune your materials-handling costs for modern, economical foundry operation.

USERS: Fargo, Howard, Coeur d'Alene, United Eng. & Fdry., Bethlehem Steel, Birdsboro Steel, Ohio Steel, Hartford Electric Steel, Harrisburgh Steel, U. S. Steel, Detroit Gray Iron.

THE ORIGINAL SWING BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER

2½, 5, AND 10 TON CAPACITIES

KRANE KAR

TRADE MARK REGISTERED

SILENT HOIST & CRANE CO., 885 63rd ST., B'KLYN 20, N.Y.

. . . IT'S EASY TO FIGURE!

DOUGHERTY

PERFECTION

PATTERN LUMBER

Saves You Money!

WHITE PINE • MAHOGANY • PLYWOOD

Hardboard for templates and lagging, dowels and boards . . . skids and crating for large castings or machinery.

Resistance to warping, cracking and hardening can mean only one thing—fewer hours required to produce a pattern; therefore, lower costs. Perfection pattern lumber is a quality produce, sawn from old growth logs and kiln dried in our own plant. Shortages prevent filling all orders but we are doing our best to keep up with the demand.

UNION WHOLESALE
YOUNGSTOWN 8, OHIO
Phone: 4-5189

DOUGHERTY
CLEVELAND 5, OHIO
Phone: Diamond 1200

KEYSTONE
PITTSBURGH 3, PA.
Phone: HEmlock 0700

LUMBER COMPANY

(*Concluded from page 230*)

Alloy iron rolls are grouped under two main classifications: 1—Those with a true chilled iron structure including (a) molybdenum chill (b) nickel-low chromium-standard phosphorus (c) nickel-chromium-molybdenum, and 2—Those with a grain roll structure showing no distinct line of demarcation between the primary chill face and the gray iron of the body center. The phosphorus usually is low and the chromium over 0.80 per cent. They include (d) molybdenum-chrome (e) nickel-chrome (f) manganese chrome (g) nickel-molybdenum-chrome (h) high nickel 4-5 per cent, high chrome 2-2.5 per cent.

Booklet Discusses Sand Practice

Foundry Sand Practice, an 80-page booklet edited by Clyde A. Sanders, engineer for the American Colloid Co., 363 West Superior St., Chicago, has been published in a revised edition and is available from that company. The booklet offers considerable useful information and recommendations on the selection of base sand for molding purposes and on mixtures of sand and binders for steel, gray iron, malleable and nonferrous foundry operations. Suggested sand mixtures are given for cores as well as molds. A separate chapter details casting defects and their causes.

Veteran Employees Honored

Falk Corp., Milwaukee, awarded service pins on June 23, to 800 employees who had served the company from 10 to 50 years. A number of these men were employed in the foundry departments of the firm. Topping the veteran employees was Herman Falk, who founded the gear manufacturing company 54 years ago. Presentation of pins was also made to the following: Harold Falk, president, 40 years; Charles Wolter, 48 years as a shopman; William S. Henderson, 32 years; Louis Falk, company treasurer, 10 years; and Robert W. Henderson, 12 years.

Offers Calculator

Federated Metals Division, American Smelting & Refining Co., 120 Broadway, New York 5, is offering a novel calculator to those who request it. Designed along slide-rule principles, the calculator gives quick-reference melting points for 98 different tin-lead solder alloys. The reverse side of the device gives comparisons of wire gauges from 0000 to 40, in inches.

·HIGH SILICON IRON·
JISCO

THIS IS *NOT* AN ORDINARY LUMP OF COAL

It is a lump of SHARON NO. 1 SEAM COAL, and, simple though it may appear, this special coal is one of the reasons why JISCO SILVERY is a *better* blending iron.

Sharon No. 1 Seam Coal is predominant in Jackson County, Ohio. Its special properties are vital to the production of JISCO SILVERY iron. It definitely is a most important factor in producing the even grain structure and uniformity of JISCO SILVERY.

In the JISCO Furnace a definite ratio of Sharon No. 1 coal and coke is used. The coal generates rich gases which pass up through the stack, satisfying atmospheric requirements. As the gases leave the furnace, they are cleaned by electrostatic precipitation before entering the stoves, where they create extremely high temperatures for the hot blast. This is important because the production of JISCO SILVERY requires higher temperatures and a richer atmosphere than ordinarily employed in blast furnace operation.

You Find the Proof in Your Cupola

JISCO blends with gray iron scrap and other melting stock to produce better castings.

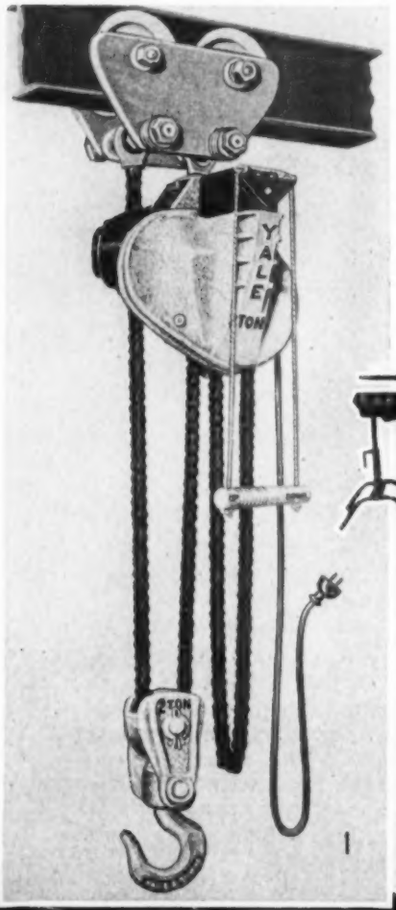
Our Metallurgical Department invites your questions.

Advice to Andrew Jackson by his Mother: "To forget an obligation or be ungrateful for a kindness is a base crime. Not merely a fault or a sin, but an actual crime. Men guilty of it sooner or later must suffer the penalty."

THE JACKSON IRON & STEEL *Company*
JACKSON, OHIO.

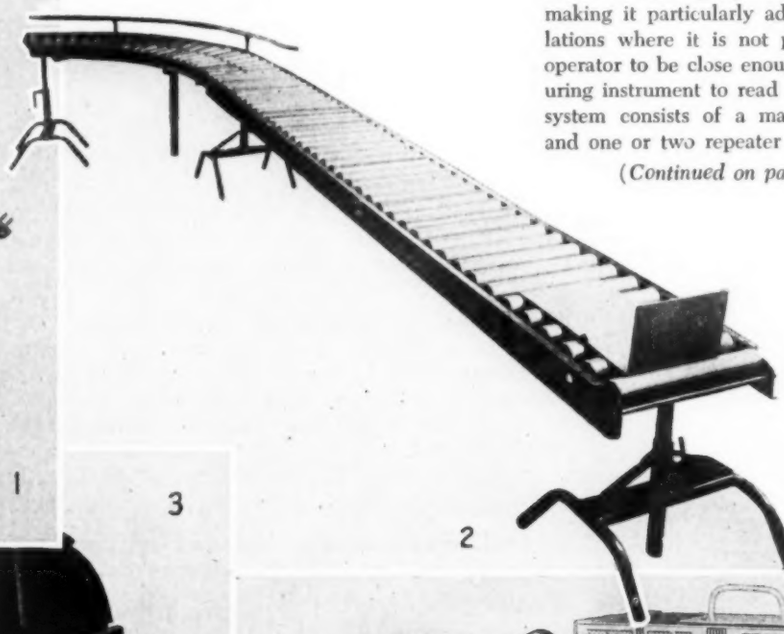
New EQUIPMENT and SUPPLIES

(1)—Hoist: Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia 24, has added a 2-ton model to its line of Midget King electric hoists. It is equipped with a 1-hp motor, and lifting and lowering is controlled by the one-hand bar-grip control. An alloy steel roller chain carries the load, with safety stops preventing overtravel of the hook. Load brake and independently acting motor brake operate whether power is on or off. Brakes, wiring and controller are totally enclosed. The hoist is available with hook for stationary use and with permanently attached trolley for use on overhead track.

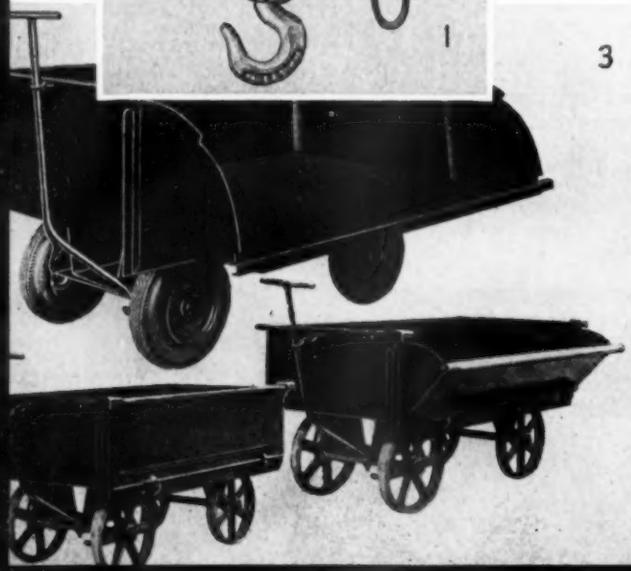


1

(2)—Conveyor: Rapids Standard Co. Inc., 308 Peoples National Bank Bldg., Grand Rapids 2, Mich., is introducing a new roller gravity conveyor designed to fill the need for a medium-duty classification standardized unit. Two standard frame lengths of 5 and 10 ft in two standard widths of 12 and 18 in. are available. Conveyor rollers, 2 in. in diameter and with curled edges, project ⅝-in. above the conveyor frame level, and are mounted on single-row radial ball bearings at each end. Rollers are spaced at 3-in. intervals but may be located at any multiple of that dimension. Roller axles are attached securely to the frame channel giving additional rigidity.

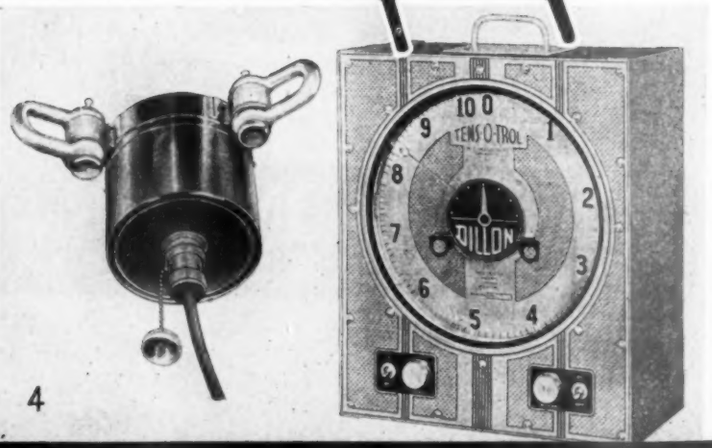

2

(3)—Load Cart: Materials Handling Division, Market Forge Co., Garvey St., Everett 49, Mass., has designed a new load cart for handling sand, coal, ashes and other aggregates. The drop side may be locked in closed, half-open or fully opened position. Inside dimensions are 60-in. length, 36-in. width and 18-in. depth. Height of bottom above floor is 18 in. and overall height 36 in. Larger and smaller sizes also are available. The 16-in. diam wheels may be metal or equipped with pneumatic or cushion rubber tires, and are provided with roller bearings.


3

(4)—Dynamometer: W. C. Dillon & Co. Inc., 5410 West Harrison St., Chicago 44, has developed a new remote indicating dynamometer, known as the Tens-O-Trol, for recording weight or tension. This equipment permits taking readings as far as 300 ft from the actual measuring dynamometer thereby making it particularly adapted to installations where it is not possible for the operator to be close enough to the measuring instrument to read it. A complete system consists of a master transmitter and one or two repeater stations requir-

(*Continued on page* 236)



4

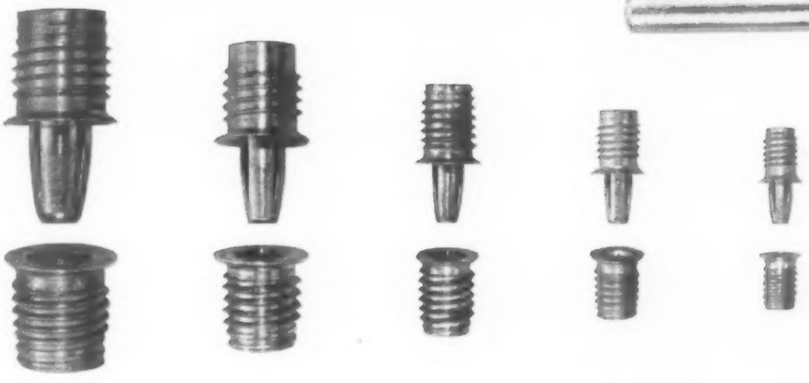
KINDT-COLLINS ANNOUNCES ANOTHER PATTERN SHOP DEVELOPMENT

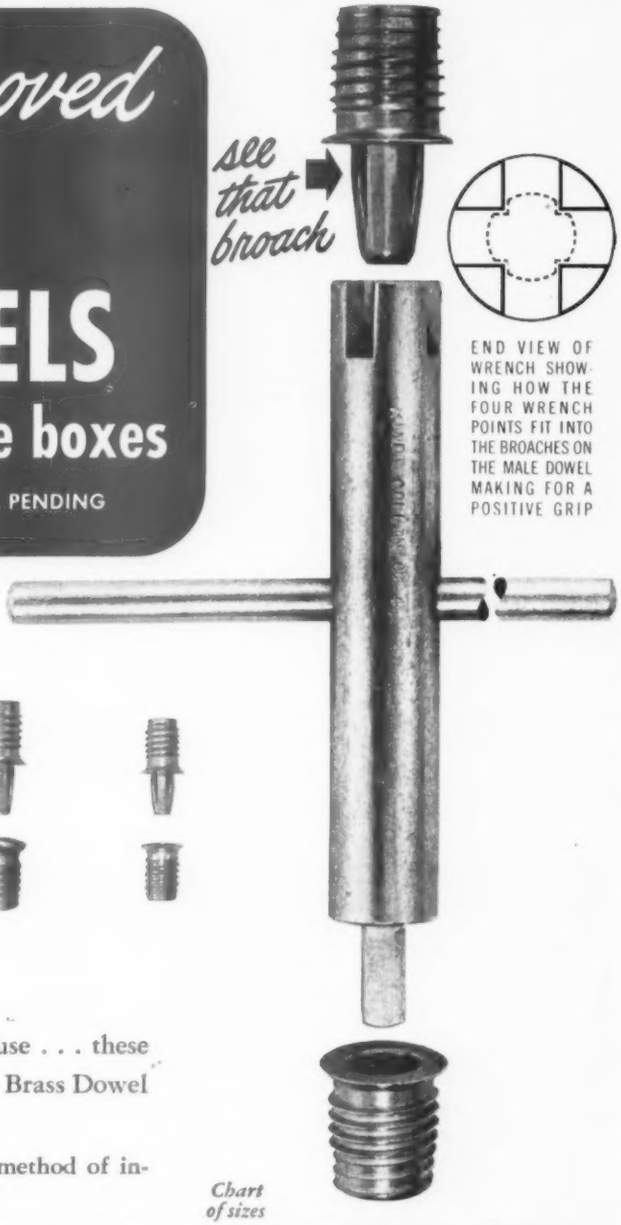
the new and improved

MASTER BRASS DOWELS

for wood patterns and core boxes

PAT. PENDING





END VIEW OF WRENCH SHOWING HOW THE FOUR WRENCH POINTS FIT INTO THE BROACHES ON THE MALE DOWEL MAKING FOR A POSITIVE GRIP

New holding power . . . new ease of use . . . these are the improvements offered you in the new Master Brass Dowel line. Here are the special features:

1. New broached head design of male part and new method of insertion eliminate twisting off in hard wood.
2. Special type threads assure tight hold especially in soft woods.
3. More accurate draw—no square-head edges to strip or wear round.
4. Easily removed for replacement if desired.
5. Precision-made to very close tolerances.

Master Brass Dowels in the new design are available only in sizes from 1 to 5, with special wrenches to fit each size. Sizes 0, 6 and 7 are available as previously.

Send us your order for the new Master Brass Dowels today, and let them prove their advantages to you right in your own shop.

Chart of sizes

Size	Dia. of Pin	Dia. of Flange	Bit Size
No. 0	7/64"	13/64"	3/16"
No. 1	5/32"	9/32"	3/16"
No. 2	3/16"	23/64"	1/4"
No. 3	13/64"	27/64"	5/16"
No. 4	19/64"	31/64"	7/16"
No. 5	13/32"	47/64"	9/16"
No. 6	9/16"	1"	3/4"
No. 7	11/16"	1 5/16"	1"

Standard Packages: Nos. 0, 1, 2 and 3 dowels packed 100 in box. Nos. 4, 5 and 6 packed 50 in box. No. 7 packed 20 in box.

KINDT-COLLINS MASTER PRODUCTS

THE KINDT-COLLINS COMPANY

"EVERYTHING FOR THE PATTERN SHOP"

12653 ELMWOOD AVENUE ★ CLEVELAND 11, OHIO

FOUNDRY FACINGS

ASBURY

CORE WASH

GRAPHITE

KLEAN-A-KAST

AN OUTSTANDING SHAKE-ON FACING

CARBON RAISING

PIPE REDUCER

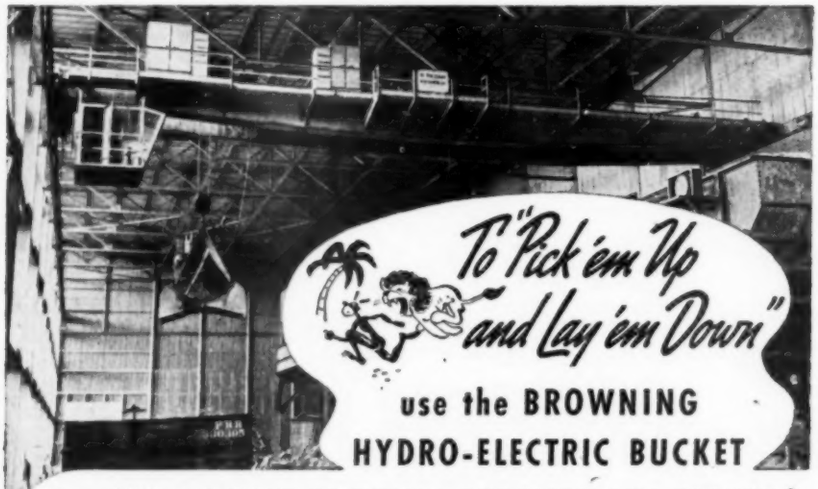
CARBON AND NON CARBON

OUR FIFTY-FIRST YEAR

THE ASBURY GRAPHITE MILLS, INC.

MAIN OFFICE AND WORKS: ASBURY, N. J.

STOCKS LOCATED: CHICAGO, MILWAUKEE, DETROIT, DENVER, ST. LOUIS, HOUSTON, CINCINNATI, LOS ANGELES, SAN FRANCISCO, SEATTLE, PORTLAND, VANCOUVER



. . NEW PATENTED PRINCIPLE, BUT TRIED AND PROVEN!

Handles many important jobs faster, better, for less. A.C. or D.C. current. Electrically driven hydraulic pump connected to cylinder and ram, in turn connected to bucket lips by trunnion; movement of ram opens and closes bucket. When bucket closes, pressure reaches maximum and oil passes through relief valve; no overloading of motor, no damage to bucket. No sheaves, cables, chains or other trouble-causing "gadgets"; closing mechanism runs in oil. Bucket opens by gravity; no power waste in closing. No headroom lost for closing. Simply hook on and plug in; 10 minutes to hook or unhook. Write today for a copy of our new, well illustrated BULLETIN.

VICTOR R. BROWNING & COMPANY, Inc.

WILLOUGHBY (CLEVELAND), OHIO

Designers and Builders of All Types and Capacities of Electric Overhead Traveling Cranes and Hoists and Electric Revolving Cranes

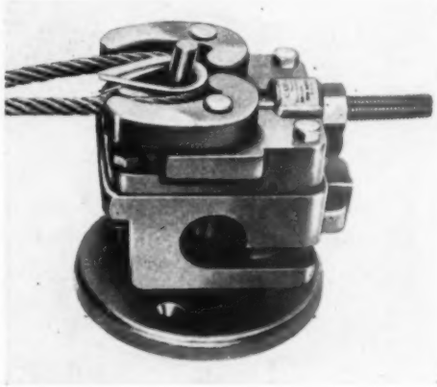
(*Continued from page 234*)

ing only 12 v for operation. The master indicating motor is mounted to the dynamometer beam in such a manner that the slightest amount of tension or weight unbalances its field. This electrical excitation is transmitted by cable to the repeater station where the field of the receiving motor is correspondingly unbalanced and the weight is recorded.

Portable Conveyor: A new lightweight portable conveyor has been announced by Material Movement Industries, (formerly Coaltoter Conveyor Co.) 310 South Michigan Ave., Chicago 4. A 12-foot model weighing only 135 lb without motor, the conveyor is made of special alloy steel and is corrosion and

abrasion resistant. Two lengths are available, 12 and 16 ft, both models having an 8-in. belt. Power is furnished by gasoline engine which is mounted above conveyor, with engine mounting adjustable to keep it level at all conveyor positions. The conveyor is also available with electric motor, or without power unit if desired.

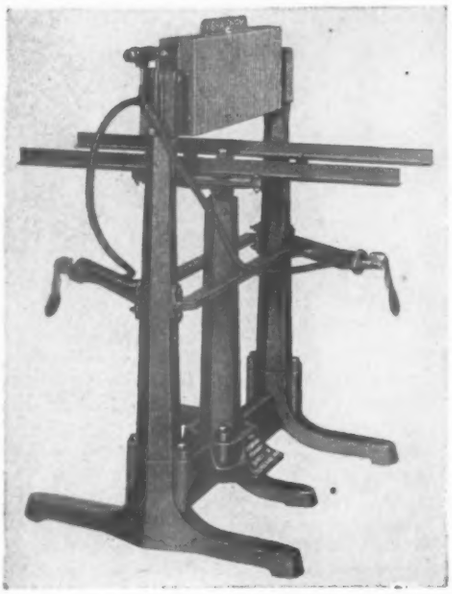
Cable Vise: Nunn Mfg. Co., Evanston, Ill., offers a new vise which forms a loop in wire rope by simply turning one hex nut with an ordinary wrench, and automatically compensates for rope sizes within its designed range,



holding loop firmly through splicing or clamping operations. Swivel base accommodates vise in either vertical or horizontal position and rotates through

(*Continued on page 238*)

REAL "COST CUTTERS"



FOR THE

FOUNDRY INDUSTRY

★★★★★★★★★★★★★★★

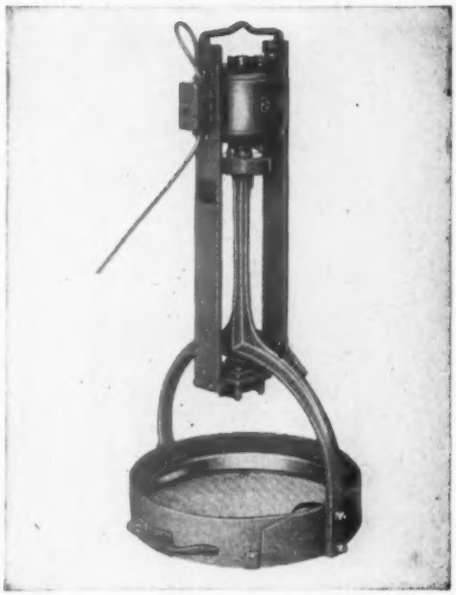
It Will

PAY YOU

to

Investigate

★★★★★★★★★★★★★★★

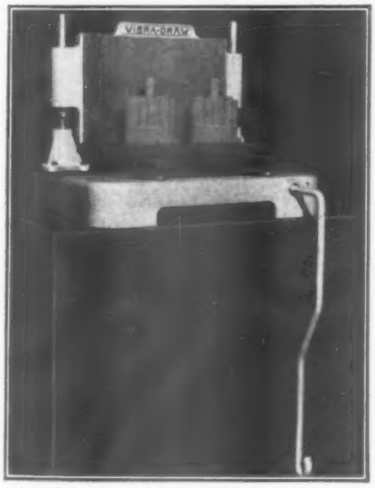


FEDERAL'S "VIBRA-DRAW" CORE DRAWING MACHINES

Cuts costs in your core room by making it easy for every core maker to draw perfect cores as fast as he can fill the core box, place it against the vibrating head and lift the box.

Made in two styles: the floor model shown above and the portable bench model below.

Immediate delivery—write for details.



FEDERAL'S WONDER CUTTERS

Two compact cutters for rods and band iron. One cuts up to 5/8″ round and the other to 7/8″ round. Readily mounted on any bench. Users say they're worth their weight in gold!

★

All Federal Products are Sold with Service

FEDERAL'S LOWE SIFTER

Save money by faster sifting, better sand conditioning with a Lowe Electric Sifter. Features: greater screening area, enclosed ball bearing motor, more shovelling room. Write for information. Prompt delivery.

FEDERAL JOLT MACHINES

Air operated, fool-proof jolt machines that ensure uniform cores. Sturdy cast iron construction with no external valves to wear out. Made in four sizes. Get our prices and deliveries.

THE FEDERAL FOUNDRY SUPPLY CO.

4600 EAST 71st STREET, CLEVELAND, OHIO

CHICAGO — CHATTANOOGA, TENN. — CROWN HILL, W. VA. — DETROIT — MILWAUKEE
MINNEAPOLIS — NEW YORK — RICHMOND, VA. — ST. LOUIS — UPTON, WYO.

and . . .

HERE'S WHY

For a quarter of a century leading industries have picked American Long-Lyfe Nozzles as their choice for efficient, low cost, long-life airblasting service.

Designed with inserts of near-diamond hardness and protecting jackets of abrasion-resisting alloy steel, American Long-Lyfe Nozzles provide uniform cleaning at far less cost per hour than an equal expenditure for ordinary nozzles.

Of even more importance is the influence of constant efficiency in reducing cleaning costs through faster cleaning time. With labor costs spiraling upward this is an extremely important factor to watch.

For complete data on American Long-Lyfe Nozzles write for Catalog No. 27

American
FOUNDRY EQUIPMENT CO.
505 S. BYRKIT ST., MISHAWAKA, IND.

NORBIDE • BEANIUM • V-METAL
NOZZLES

(*Continued from page* 236)

360°, clamping firmly in any desired direction. Vise takes rope sizes ¼ through ½ in.

Lift Truck: Towmotor Corp., 1226 East 152nd St., Cleveland, features a side-mounted motor engineered to cut wheelbase length to 35 in. in its Model LT-35 lift truck, which reduces overall length without sacrifice of strength. Lifting and tilting mechanisms are hydraulic. The truck weighs only 2800 lb but will lift, carry and stack a 1500 or 2000 lb

load in areas previously inaccessible to lift truck operation such as tight aisleways, elevators and crowded confines of highway trucks and freight cars. Operator's seat at side of power unit is fully protected front and rear. Two wheels on steering axle achieve short turning radius without sacrifice of safety or stability. Major parts are easily accessible for maintenance inspections and adjustments.

Hopper: Roura Iron Works, 1405 Woodland Ave., Detroit 11, has designed a 2-yd self-dumping hopper to fit any standard fork or platform-type lift truck. This completes the line of self-dumping containers in sizes of ½, ¾, 1

(standard), 1½ and 2 yd. Rugged construction to handle any material, hot, cold, wet or dry, is provided by all-welded 3/16-in. steel plate, reinforced by 2-in. steel angles for the hopper, and ½-in. welded steel frame. By releasing safety catch, the hopper automatically dumps and returns to upright locked position without another manual motion.

Horizontal Grinders: Master Pneumatic Tool Co. Inc., 2100 Keith Bldg., Cleveland, has recently put on

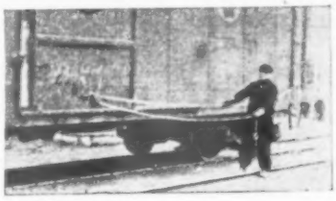
the market a new line of horizontal grinders in 4, 6 and 8 in. sizes. Industrial hard chrome is used on main wearing parts. Magnesium housings make them light in weight, tough and rigid. Correct load and free speeds are controlled by positive, quick acting, push valve governor, regardless of fluctuating air pressure. Wheel end and throttle handles are of new design to give better grip. The grinders are available in both light and heavy duty models.

Portable Muller: Beardsley & Piper Co., 2424 North Cicero Ave., Chicago 39, has announced an enlarged portable muller, No. 7 Mulbaro, for mulling both molding and core sand with double the capacity of former models. Com-

posed of two separate units, a three-wheeled barrow and a mulling mechanism, the barrow is used for transportation and for holding sand while it is being mulled. It has a spring-controlled, hinged bowl to facilitate ease of loading and dumping. Sand is dumped completely without shoveling by means of a spring mechanism. Mulling mechanism is operated by electric motor, suspended by a chain, to be lowered and attached to barrow for mulling operation. Two rubber covered wheels, designed to contour of barrow bowl, fit down into sand in barrow at such an angle that they accurately conform to curve of bowl as they travel. Improvements on Model No. 3½ also have been made. A new transmission case featuring spiral gears with forced feed lubrication, has been incorporated. Case is located on top of mulling hood which is of a tapered de-

sign to facilitate easy removal from barrow. Newly designed plow provides more thorough mulling.

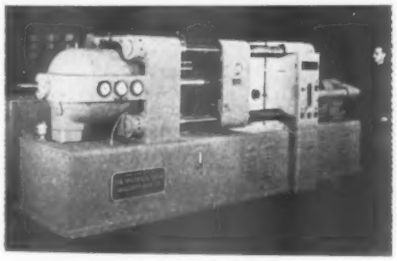
Car Door Opener: Industrial Products Co., 2820 N. Fourth St., Philadelphia 33, is offering a simple tool which allows one man to open or close



any box car door in a few seconds' time. Weighing only 15 lb, the opener is easy to manipulate but is built for rough service.

Floor Compound: Monroe Co., 10706 Quebec Ave. Cleveland 6, announces a new repairing compound for concrete floors. Known as Swift-Floor, it sets by compression rather than by water evaporation, and repaired sections can be used immediately upon completion. The material contains no asphalt, cement or gravel, and comes ready for use without mixing.

Die Casting: Hydraulic Press Mfg. Co., Mount Gilead, O., announces two new high pressure die casting machines for casting magnesium, aluminum and copper alloys, with mold clamping, metal injecting, core pulling and ejecting units all operated by direct hydraulic means. The new models have injection capacities from 12½ to 100 cu in. per cycle. Injection pressures from 6000 to 50,000 psi are available, depending upon



plunger diameter. Standard aluminum machine, Model 400-A, employs straight-line hydraulics, injection ram directly connected to hydro-power radial pump. Maximum injection speed is 750 in. per min. Standard magnesium machine, 400-M, has plunger actuated by nitrogen accumulator or "bottle." This provides injection speeds up to 7200 in. per min. Injection speed is adjustable, so this machine can also be used for die casting other alloys. Basic difference between the two models is the speed of plunger. Control of machines is semi-automatic,

CARBOTTOM FURNACE particularly adapted to handling large castings. As designed by Bellevue engineers highly efficient and economical and subject to very accurate temperature control with automatic proportioning burner equipment. In comparatively small model shown, miscellaneous castings and forgings are heat treated. . . . Car type furnace can be had in various designs . . . over firing . . . under firing . . . recirculating type method.

Bellevue INDUSTRIAL FURNACE COMPANY
2971 BELLEVUE DETROIT 7, MICH.

EASIEST TO HANDLE!

WITH THE ILER crucible draw furnace

No other crucible type furnace offers the ease of operation possible with the Iler. Note the unique, split-body design. See how quickly and easily crucibles are handled. No tongs required. Pour direct. No overheating nor transfer of metals necessary.

The automatic Fen air-lift opens and closes the furnace at the touch of a valve. Heat trapped in upper portion cuts reheating time, saves fuel. Furnace rests on the floor, requires no pit. Pattern shops are finding the Iler highly profitable in making metal patterns.

Available in sizes 50-70-90-125 to accommodate crucibles of corresponding size. Burner for gas or oil optional. Prompt deliveries.

Get the facts on the Iler for your non-ferrous operations NOW.

THE FEN MACHINE CO.
1350 BABBITT ROAD
CLEVELAND 17, OHIO

ILER
CRUCIBLE
DRAW FURNACES

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Here's a BETTER high speed abrasive wheel for shops whose needs are unpredictable. KEYSTONE RESINOID WHEELS. . .

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  Great Strength and Rigidity.
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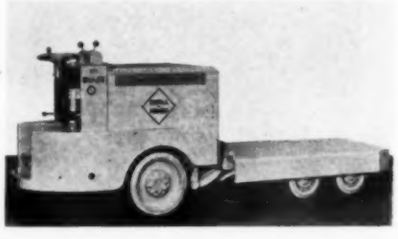
KEYSTONE ABRASIVE WHEEL INCORPORATED
RESINOID AND VITRIFIED
CARNEGIE, PA.

operator starting each cycle by means of an electrical foot switch. Balance of cycle is automatic, however manual controls are provided for operating each unit independently.

Packing Rings: Green, Tweed & Co., Bronx Blvd. at 238th St., New York 66, has designed a new packing, available in molded ring form, made to exact dimensions. The cut-away illustration of an assembled set shows meth-

od of assembly inside of stuffing box. Bottom ring is installed first and receives full impact of pressure on power stroke. Bottom ring expands wedge-shaped lip of each ring above it so that packing is pressed against both rod and side walls, effectively preventing leakage. Binding is prevented by infiltration of fluid between rings and storage of fluid in arrowhead reservoir. On return stroke the lessening of pressure permits built-in restitutional property of each ring to exert itself, enabling rings to contract to normal. Any braking action by packing is prevented. No special adapter ring is required since top ring has flat top surface and 45° angle surfaces that accommodate any standard shape gland-follower.

Industrial Truck: Elwell-Parker Electric Co., 4220 St. Clair Ave., Cleveland 14, has developed a 10-ton industrial truck, now available for gen-



eral use. Driven by means of storage batteries and electric motor, the new truck has an overall length of 147 in., width 45 in. It is steered by means of all six of its wheels, four under the platform, insuring stability of the load, and can turn in aisles 71 in. wide. Speed may be accelerated rapidly to 6 mph, while truck can come to a dead stop within a few feet. Electric drive and controls provide an unusual degree of flexibility. Body of truck is low and operator has complete visibility of platform, load and surroundings.

Fork Truck: Lewis-Shepard Products Inc., 222 Walnut St., Watertown 72, Mass., has perfected a new electric fork truck of 4000-lb capacity. Using a 48-in. fork, carrying a 48-in. load, the truck will enter an aisle 12 ft wide and, in one continuous forward travel, make a single right angle turn and right angle stack with no backing or filling. The truck has a short turning radius, an extremely low center of gravity and limited overall length, which provide maximum maneuverability under all conditions, and stability when making abrupt turns and when elevating or lowering a load.

Glove Guard: Industrial Gloves Co., Danville, Ill., has developed a reversible leather pullover guard, steel reinforced and steel stitched, to be used over standard cotton gloves by punch

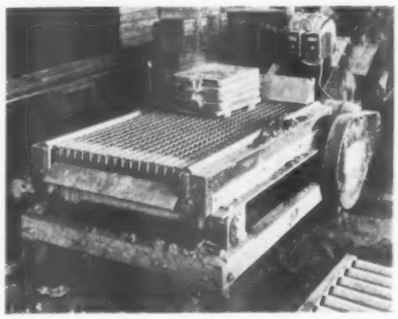
press operators, handlers of sharp, jagged castings, stampings, etc. The guard is held firmly on gloves by means of adjustable tape at wrist end and is available for finger or thumb as needed.

Safety Flooring: Chemical Products Division of Goodyear Tire & Rubber Co., Akron, O., announces a non-slip safety flooring and protective covering material for metal, wood and concrete which is a combination abrasive aggregate and plastic binder and said to be ideal for surfaces where safety under foot is needed. Available in a choice of six colors, the material may be applied by trowel, spray gun, or brush, and will withstand crush loads in excess of 7000 psi.

Shoe Ventilator: Dale Vent-O-Sole Inc., 60 East 42nd St., New York 17, has available a washable shoe ventilator to be slipped into the shoe for control of athlete's foot, blisters and other ailments. Its function is entirely mechanical. Each step the wearer takes pumps air into the shoe, circulates it

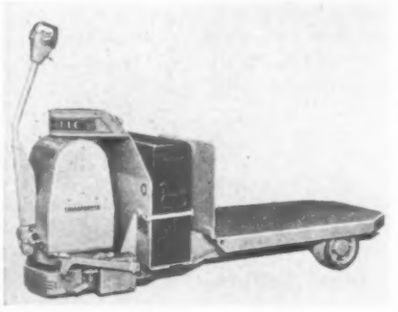
over grid of woven plastic, evaporates moisture from plastic surface and expels moisture-laden air.

Shakeout: Royer Foundry & Machine Co., Kingston, Pa., has made various improvements in its Walking



Beam shakeout. New units are wider than the original ones, the mechanism has a slightly greater "throw," and both the walking beam and the stationary grid surfaces now are hardfaced to obviate wear from the sand, castings and flasks that track across them during the shakeout operation. The units also are built on I-beam supports to elevate them from the foundry floor so that a conveyor can be placed underneath to carry away sand. This obviates need for extensive masonry work, a pit only a few inches below the floor being required.

Hand Truck: Automatic Transportation Co., 121 West 87th St., Chicago 20, has announced improved models of an electric propelled hand truck with a score of major improvements which include a new hydraulic lift pump, an automatic brake, redesigned wound dc motor and driving unit and other changes in accessory parts. The new model is available in four sizes: 4000



and 6000 lb capacity platform types for skid platforms; 4000 lb capacity fork type for pallet loads; and a special 3000 lb capacity fork model for tin plate. A new push-pull unit uses the power unit of the hand truck and incorporates all of its improvements. A higher driving unit is a feature of the new model trucks which makes possible relocation of component parts resulting in greater accessibility for maintenance.

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Industry BRIEFS . . .

MBM FOUNDRY INC. has started production of gray iron castings at its plant, 4730 Warner Rd., Garfield Heights, Cleveland suburb. The new company is headed by William C. Manwell, formerly general foundry superintendent, Fulton Foundry & Machine Co., Cleveland. Other officers include V. G. Bidenharn, secretary-treasurer, and Joseph P. Manwell, vice president and production manager. The company will specialize in jobbing and semiproduction castings ranging from 1 lb to 5 tons.

° ° °

Tool & Die Division of Lester Engineering Co., Cleveland, has been reorganized under the name of the Lester-Aetna Die Co. and moved from Cleveland to Warren, O. The company is owned jointly by Lester Engineering Co. and Aetna-Standard Engineering Co., Warren, O.

° ° °

Edw. S. Christiansen Co. has removed its eastern division sales offices from the 32nd floor of 30 Rockefeller Plaza, New York, to show room and office space on the mezzanine floor of that building. The company will exhibit all forms of aluminum and magnesium raw materials as well as semi and fully fabricated assemblies and finished consumer goods.

° ° °

Castalloy Co., Inc., Cambridge, Mass., has put into operation a new foundry designed and built expressly for making aluminum or magnesium permanent mold castings. The new foundry, located at 363 Third St., is equipped to handle volume production.

° ° °

National Radiator Co. plants at Johnstown and Lebanon, Pa., have been awarded the United States Department of Labor's Certificate of Safety Achievement for reducing accidents 40 per cent or more in the last six months of 1945. One Johnstown plant reduced its accident rate 63 per cent, the other Johnstown plant and the Lebanon plant cutting their rates 100 per cent.

° ° °

Foundry of Highland Mfg. Co., Tulare, Calif., producer of irrigation gates, valves, machine parts, etc., was destroyed by fire June 29, with loss estimated at $50,000. The plant, which was moved to Tulare from Hollywood, Calif., about a year ago, is owned by William Howe. It will be rebuilt as soon as materials are available.

° ° °

Velsicol Corp., manufacturer of core oils, resins and other chemical products of petroleum derivation, is constructing a new office and laboratory building at 320-348 East Grand Ave., Chicago. It will provide the most modern facilities, including a pilot plant and instrumentation laboratories. The company now employs more than 50 chemists and assistants at its present location, 120 East Pearson St., Chicago.

° ° °

Sales of foundry equipment in May represented 577.3 per cent of the 1937-1939 monthly average, according to the Foundry Equipment Manufacturers Association. This compares with 701.2 per cent in April and 404.7 per cent in May, 1945.

° ° °

Production of gray iron castings in the Philadelphia Federal Reserve District declined 10.2 per cent in May compared with April, and was off 7.5 per cent from the corresponding 1945 month, according to the Industrial Research Department, University of Pennsylvania. Malleable iron production dropped 1.3 per cent from April but was 66.6 per cent ahead of a year ago. Production of steel castings topped April by 1.4 per cent but was 40.9 per cent below last year.

° ° °

Hays Corp., Michigan City, Ind., manufacturers of boiler room and industrial instruments and controllers, has added a line of flow meters formerly handled by the Cochrane Corp., Philadelphia, and manufactured by the Penn Industrial Instrument Corp., that city.

° ° °

Atlas Foundry, 2300 Bloomingdale Ave., Chicago, a gray iron shop, has been purchased by American Well Works, 100 N. Broadway, Aurora, Ill. It will be operated by the latter as a wholly owned division.

° ° °

R. C. Dexheimer Foundry Co., 1620 Ontario Ave., Sheboygan, Wis., closed since the death of R. C. Dexheimer, has

been re-opened by Fred Knoll and will operate under the name of Dexheimer Foundry.

• • •

Samuel Greenfield Co. Inc., Buffalo, smelter and refiner, has opened new offices in the National Bank building, Detroit. The company expects to warehouse a complete stock of brass, bronze and aluminum ingot and to buy aluminum and bronze scrap in Detroit. In addition, the new office, together with the Greenfield research department, will give counsel on metallurgical problems and foundry practice.

• • •

The Charles Taylor Sons Co., Cincinnati has appointed Refractories Engineering & Supplies Co. to handle sale of its refractories in Canada. J. L. Spence, Hamilton, Ont., and G. W. Paterson, Montreal, Que., managers of the Canadian company, formerly were associated with Canadian Refractories Ltd.

• • •

Essaness Sales Service is operating under the new name of Foundry & Industrial Equipment Co., in new enlarged offices at 20 West Jackson Blvd., Chicago 4.

• • •

E. F. H. Aluminum Foundry & Smelting Co., 3300 East 87th St., Cleveland, has received a building permit for a $14,000 plant addition.

• • •

A. Klachko plans construction of a one-story foundry building of steel and corrugated iron, on Bandini Blvd., Vernon, Calif., 75 x 120 ft.

• • •

Haynes Foundry Equipment Co., Kalamazoo, Mich., has purchased a larger building at 814 Ada St. to handle an expanded business volume. The company specializes in new and rebuilt foundry equipment and foundry supplies.

• • •

Induction Steel Castings Co. Inc., 18021 East Nine Mile Rd., East Detroit, Mich., has been incorporated to manufacture ferrous and nonferrous castings and metal products, by Karl E. Ness, Detroit.

• • •

Pleasant Heights Foundry Co., East Liverpool, O., has been incorporated by William N. Simms, with $25,000 capital, to manufacture cast iron and other metal products.

• • •

Carondelet Foundry Co., St. Louis, plans construction of a one-story foundry addition, 31 x 201 ft, to cost, with equipment, about $50,000.

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ASTM REVIEWS CASTING SPECIFICATIONS

(*Continued from page* 79)

0.75 to 1.05 Ni, 0.40 to 0.70 Cr, and 0.30 to 0.60 Mo. Tensile strength of the new WC3 grade is 70,000 psi min., yield point 45,000 psi min., elongation in 2 in. 22 per cent min., and reduction of area 35 per cent min.

With reference to new tentative specifications issued as A 281-45 T on Mild to Medium-strength Carbon-steel Castings for General Applications, the former ASTM designation A27 will be reassigned. A change in the specification after grade 65-35 states that when full annealing is required by the purchaser the yield point value will be 33,000 psi instead of 35,000 psi. With reference to tentative specification A 282-45 T on High Strength Steel Castings for Structural Purposes, the former ASTM designation A 148 will be reassigned. Change in the specification is in value for reduction of area for grades 120-100 and 150-125 from their present values of 35 and 25, respectively, to 30 and 22 per cent.

Make Editorial Changes

In report of Committee A-3 on Cast Iron, presented by James T. MacKenzie, certain editorial changes were recommended in standard specification A 48-41 on Gray Iron Castings and include section 9b to read "If any test specimen shows defective machining or obvious lack of continuity of metal, it shall be discarded and replaced by another specimen." In section 12 the first sentence is changed to read "The castings shall conform substantially to dimensions on drawings furnished by the purchaser or to dimensions predicated by the pattern supplied by the purchaser, if no drawing has been provided. The castings shall be free from injurious defects." Explanatory notes 2 and 3 are deleted, and this follows substituted as note 2: "The higher strength irons are usually more expensive to produce and machine."

Report of Committee B-7 on Light Metals and Alloys, Cast and Wrought, presented by D. L. Colwell, indicated a slight modification in the code system for designation of magnesium alloys. It also recommended the following 5 tentative specifications be continued without revision: B 26-44 T on Aluminum-base Alloy Sand Castings; B 58-44 T on Aluminum-base Alloys in Ingot Form for Sand Castings; B 108-44 T on Aluminum-base Alloy Permanent Mold Castings; B 112-44 T on Aluminum-base Alloys in Ingot Form for Permanent Mold Castings; and B 125-44 T on Aluminum-base Alloys in Ingot Form for Die Castings.

Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought, presented by G. H. Harnden, contained a new proposed Tentatitve Recommended Practice for preparing tension test specimens for copper-base alloy castings which is published on the Foundry Data Sheet on page 127 of this issue. At the same time the sections for the test bar coupons and test specimens appearing in various specifications were recommended to be deleted and replaced by appropriate reference to the new recommended practice. This involves changes in standard specifications on B 61-44 on Steam or Valve Bronze Castings, and B 62-44 on Composition Brass or Ounce Metal Castings. Ten tentative specifications requiring change are B 22-45 T on Bronze Castings for Turntables; B 132-44 T on Leaded High Strength Yellow brass; B 143-45 T on Tin-bronze and Leaded Tin-bronze Sand Castings; B 144-45 T on High-leaded Tin-bronze Sand Castings; B 145-45 T on Leaded Red Brass and Leaded Semired Brass Sand Castings; B 146-45 T on Leaded Yellow Brass Castings; B 147-44 T on High Strength Yellow Brass and High-strength Leaded Yellow Brass Sand Castings; B 148-45 T on Aluminum-bronze Sand Castings; B 149-44 T on Leaded Nickel-brass and Leaded Nickel-bronze Sand Castings; and B 198-45 T on Silicon-bronze and Silicon-brass Sand Castings.

Change Committee Title

Report of Committee B-4 on Electrical-heating, Resistance and Furnace Alloys, presented by Mr. Hartshorn, stated that the title of the committee is to be changed to Electrical Heating, Resistance and Related Alloys. It also pointed out that tentative specification B 190-45 T on Chromium-nickel-iron Alloy Castings (25-12 class) for High-temperature Service has been revised to include a brief appendix listing some of the more important technical papers on creep at elevated temperatures. New tentative specification B 207-46 T on Nickel-chromium-iron Alloy Castings (35-15 class) for High-temperature Service has been accepted by the society's administrative committee on standards.

In a session on effect of temperature on properties of metals for gas turbines a number of papers were presented in which reference was made to "precision cast" alloys, and the consensus was that wrought alloys have higher endurance strength at 1200 F than cast alloys, at 1500 F the cast and wrought alloys are about the same, and around 1600 F the cast alloys show better endurance properties. In a paper by J. W. Freeman, E. E. Reynolds and A. E. White, Uni-

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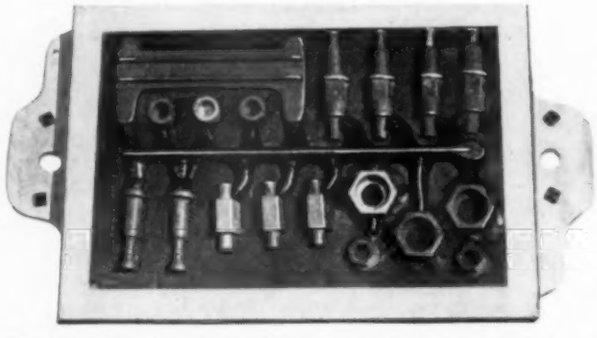

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versity of Michigan, on "High-Temperature Alloys Developed for Aircraft Turbo-superchargers and Gas Turbines," it was mentioned that precision castings of cobalt-base alloys developed rupture strengths at 1350 F up to 47,000 and 36,000 psi for fracture in 100 and 1000 hr, respectively. Rupture strengths for fracture in 100 and 1000 hr ranged up to 17,000 and 14,500 psi at 1700 F, while similar values at 1800 F were 11,000 and 9800 psi.

In a paper by H. C. Cross and W. F. Simmons, Battelle Memorial Institute on "Heat-resisting Metals for Gas Turbine Parts," it was stated that in stress-rupture tests at 1600 F the cast cobalt-base alloys showed better properties than forged alloys. For 100 hr rupture time all forged alloys were below 15,000 psi, while cast alloys were above 15,000 and up to 20,500 psi. For 1000 hr rupture time the cast alloys ranged from about 10,000 to 18,000 psi, while all of the forged alloys were below 10,000 psi. Stress-rupture tests were made at 2000 F on the better cast alloys. The best alloys showed rupture in 0.5 to 1.0 hr at about 10,000 psi and in 100 hr between 4000 and 5000 psi. At 1350 F the better forged alloys as a group had better creep resistance than the cast alloys.

In an investigation of chromium-base alloys R. M. Parke and F. P. Bens, Climax Molybdenum Co., reported that one containing 60 per cent Cr, 15 per cent Fe and 25 per cent Mo showed a good combination of ductility and strength at 1600 F. In stress-rupture tests on vacuum melted and poured castings the alloy supported a load of 30,000 psi at 1600 F for 430 hr with 6 per cent elongation and 6 per cent reduction of area. In another paper on "Metallurgy of High-temperature Alloys Used on Current Gas Turbine Designs," by F. S. Badger Jr. and W. O. Sweeney Jr., Haynes Stellite Co., Kokomo, Ind., the development of a nickel-molybdenum wrought alloy and a cobalt-base cast alloy was discussed, and their successful fabrication by forging and precision casting to meet wartime mass-production requirements was described.

ASTM Occupies New Headquarters

American Society for Testing Materials has moved its offices from 260 South Broad St., to its permanent headquarters building at 1916 Race St., Philadelphia. The building, which was purchased and remodeled through contributions made by many of the companies and individuals active in the organization, will provide much needed additional space required through staff expansion.

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NEW TRADE PUBLICATIONS...

FOUNDRY EQUIPMENT: American Foundry Equipment Co., 505 South Byrkit St., Mishawaka, Ind., has published two new catalogs describing foundry equipment. Catalog No. 25A describes various models of sandcutters, giving specifications and dimensions as well as photographs showing construction and operation. Bulletin 10A, an 8-page bulletin of descriptive matter on a core rod straightener and shear machine, carries illustrations of various models and specifications including operating data.

ALUMINUM ALLOY: Apex Smelting Co., 2537 West Taylor St., Chicago 12, in an 8-page booklet recently issued, supplies necessary information on an aluminum alloy, Apex 50, for general casting requirements. The booklet furnishes chemical composition, typical mechanical and physical properties of the alloy.

DIE CASTING MACHINES: An instructive folder, L-24-KB, on a new design of full-hydraulic, fast operating cold chamber die casting machines, has been issued by Hydropress Inc., 570 Lexington Ave., New York 22. The principles of die casting with the machines are discussed in detail and diagrammed in three typical stages. Illustrations and close-up views describe essentials of progressive die casting and a specification chart shows which model is best suited for given production jobs. Machines are designed to cast alloys of copper, aluminum, magnesium and zinc, from 3 to 300 cu in.

INDUSTRIAL DEVELOPMENT: "The Best Location in the Nation," a booklet published by the Illuminating Co., Cleveland, presents a comprehensive, concise picture of the advantages which the Cleveland-Northeast Ohio area affords to industry for production, distribution and management headquarters. Advantages described include superlative transportation, adequate electric power at low rates, basic materials available, ample financial services, diversified industries to supply and be supplied, unlimited fresh water supply, desirable plants and plant sites and numerous business and industrial services.

BLOWERS: Bulletin No. 22-23-B-12, published by Roots-Connersville Blower Corp., 606 Madison Ave., Connersville, Ind., is a 24-page booklet which describes a line of rotary positive blowers, built in a wide range of sizes, from 5 to 50,000 cfm, at pressures up to 30 lb, and for vacuums up to 28 in. Hg. In addition to numerous installation illustrations, the bulletin shows characteristic curves, cross-sections, and exploded views to show operating principle and construction features. Relief valves and other accessories are described and illustrated, and there is a page of detailed specifications, and a table of standard sizes covering gear diameters from 8 to 22 in.

TRUCK LOADER: Clark Tructractor Division of Clark Equipment Co., 1016 24th St., Battle Creek, Mich., presents a better way to load and unload highway trucks and trailers, in a material handling news pictorial, Vol. 4, No. 3, describing a light, compact fork truck designed for handling 100 lb loads in and out of highway vehicles and elevators which lack capacity to accommodate heavier loads.

FURNACES: W. S. Rockwell Co., 210 Eliot St., Fairfield, Conn., has issued Bulletin No. 423, a 4-page circular describing pusher type furnaces for uniform heat treatment requiring variation in time and rate of heating and cooling. Gas, oil or electricity may be utilized for heating. Designs developed to meet different conditions for moving the work through heating and cooling operations are illustrated.

PYROMETER SUPPLIES: Brown Instrument Co., Accessories and Supplies Division, Philadelphia 44, has issued a buyers' guide on standard pyrometer supplies. Designated as No. 100-1, the booklet presents information on how to order thermocouples, protecting tubes, thermocouple wire, lead wire, insulators, etc. Descriptions and prices on various types of standard thermocouples for applications in all industries are given.

COMPRESSOR UNIT: Cooper-Bessemer Corp., Mount Vernon, O., in a recently published Bulletin No. 338, describes a gas-engine driven compressor unit, available in 4, 6, 8 and 10 cyl sizes, with a rating of 62½ hp per cyl at 500 rpm, for power requirements ranging from 250 to 625 hp. The booklet emphasizes the advantages of horizontal compressor cylinders with V-angle power cylinders in the same vertical plane. A cross section diagram showing location of various components, illustrations of parts and complete specifications are included.

FURNACES: Stroman Furnace & Engineering Co., Division of Petersen Oven Co., 300 West Adams St., Chicago 6, offers a 4-page bulletin No. 105, which describes manual tilt crucible melting furnaces for brass, bronze and aluminum alloys. In this type of furnace the crucible is permanently fixed into place, and the furnace is manually tilted by means of a hand wheel connected to proportional gears. Furnaces are available for either oil or gas fuel. Cross section showing lining construction, and specifications are included.

CUTTING MACHINES: Air Reduction, 60 East 42nd St., New York 17, has published a bulletin describing its automatic oxyacetylene cutting machines. The book covers specifications, operating instructions and electrical requirements and contains illustrations of machines and color diagrams of cutting ranges.

LADLES: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill., has issued a circular containing illustrations and descriptions of a new line of ladles, gear brackets and ladle handlers. The bulletin

shows various models, including crane, truck, bottom tap, teapot, slag, cylindrical pouring and trolley pouring ladles as well as a ladle preheater, with details of operation.

ALUMINUM ALLOYS: National Smelting Co., 6706 Grant Ave., Cleveland 5, in a bulletin recently issued describes its new series of ternalloy aluminum base alloys in the aluminum-magnesium-zinc system. The bulletin gives information on aging characteristics, mechanical and physical properties as sand cast and chill cast, and chemical composition. The alloys are said to have exceptionally high strength without recourse to heat treatment; dimensional stability; excellent machinability; good polishing characteristics and good corrosion resistance.

SHOT PEENING: Pangborn Corp., Hagerstown, Md., offers a brochure that covers complete application and performance data on the practical use of shot peening in the metal working field for increasing fatigue life of metals. Drawings, charts, and photographic reproductions cover application of shot peening to modern production requirements and gives performance data on practical use of the method wherever tensile stress is of a bending or twisting nature.

DRAFT CONTROL: Campbell Engineering Co., Appleton, Wis., in a 16-page bulletin entitled "How To Cut Your Fuel Bill," presents diagrams showing how to stop combustion fuel losses. Electric draft controls in different models are shown, as well as installations showing definite fuel savings and elimination of smoke. Data are given on how electric draft controls operate with stokers, oil and gas burners.

BENTONITE: American Colloid Co., 363 West Superior St., Chicago 10, has issued a 4-page circular, describing Volclay, a western bentonite high in colloidal mineral content. Mining and processing operations are depicted.

COPPER ALLOY: Ampco Metal Inc. Milwaukee 4, offers Bulletin 81, which describes a new high conductivity alloy, Ampocoloy 90, for copper castings, with a minimum electrical conductivity of 90 per cent. Chemical analysis and physical properties are given.

DUST COLLECTORS: Individual type dust collectors suitable for collecting dust, dirt and lint from dry grinding, buffing, polishing, etc., are described in a new catalog, A-350, available from Aget-Detroit Co., 602 First National Bldg., Ann Arbor, Mich. Specifications of models with ratings, together with prices of units and accessory equipment, are given.

ALUMINUM CASTINGS: Aluminum Alloys Corp., 7447 St. Aubin Ave., Detroit 11, has prepared a fully illustrated, 18-page catalog describing the company's complete facilities for production of sand or permanent mold aluminum castings, and containing tables on chemical and physical properties of aluminum alloys. General characteristics and uses of aluminum are also given.

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"RAPID" HAND SQUEEZER

$122.00

Will handle a lot of your bench jobs and save you money by trebling your production.

Handles flasks up to 16 x 30 inches. Comes complete with benches. Portable or Stationary Type.

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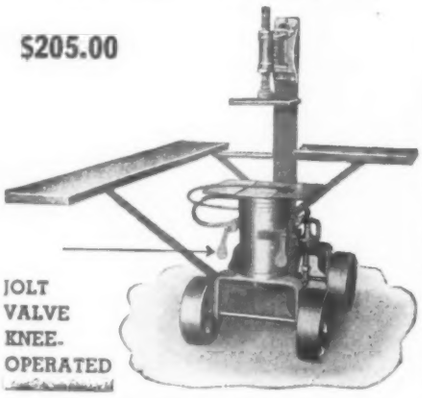
30% increased jolt capacity

$205.00



A Foundry producer of good molds for over 20 years.

Simple to operate.

Squeeze Plate quickly adjusted. Low initial cost.

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The demand for more accurately controlled operation for war-time production was met by the foundry industry. The operating standards achieved then must now be maintained. Modernization is a must if peace time competition is to be met.

Ross Core and Mold Ovens are expertly designed to provide accurately controlled operation. Available in a selection of types, they constitute a sound investment that will pay substantial returns in better quality and greater output of foundry products.

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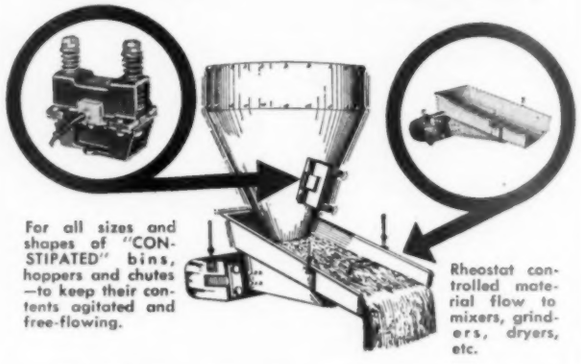
"Pulsating Magnet" **ELECTRIC VIBRATORS**

"Vibra-Flow" **VIBRATING FEEDERS**



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No Moving, Wearing Mechanical Parts

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Featuring double ball-bearing construction and efficient single-wheel mounting.

Grinding wheel rotates on double bearings around a dead shaft anchored at both ends—completely eliminating all vibration and shaft whip . . . and the entire unit guaranteed for two years!

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CUPOLA LININGS LADLE LININGS
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also linings for all types of nonferrous furnaces

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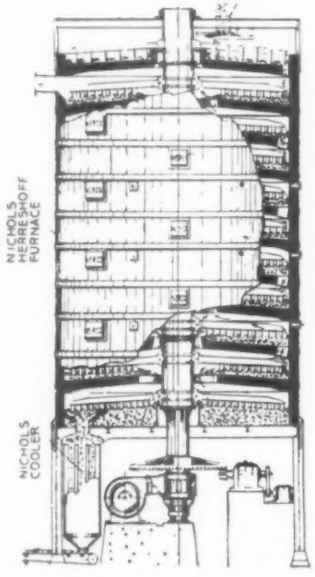

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Nichols Engineering service is available for recommending reclamation equipment to meet individual requirements.

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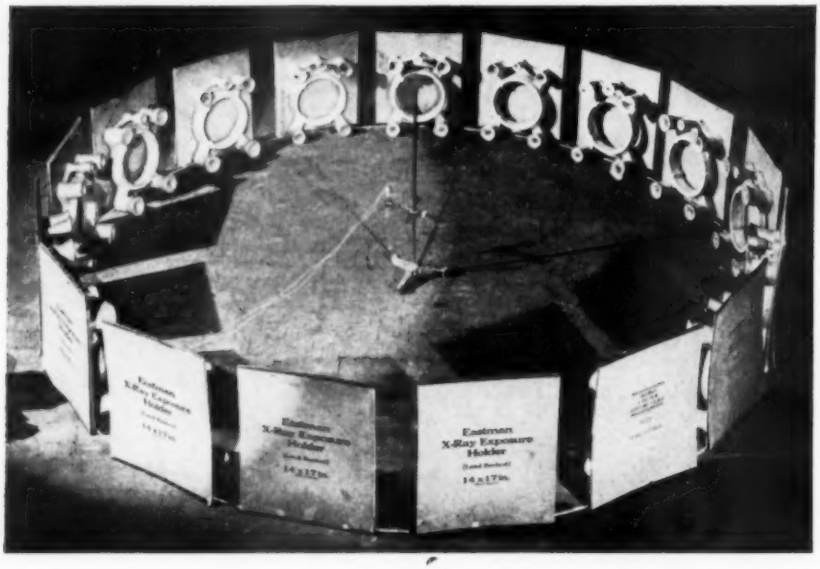
RADIUM RADIOGRAPHY *Performs a* NEW FUNCTION



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"Directional solidification" can easily be studied by the set-up illustrated in the photograph—to indicate the best method of casting with a minimum of defects in the casting itself.

Radium has become a new foundry tool which directly effects an increase in yield. It permits accurate determination of the proper procedure in gating and risering "tough" castings. Seventeen cylindrical castings were radiographed simultaneously by Crane Co. to ascertain the most productive and economical foundry practice.

Radium thus performs a valuable additional function.

For inspection, for determination of directional solidification, Radium is available in capsules of various unit strength in duralumin holders which may be leased or purchased at low rates.

The rental includes full coverage insurance, heavy lead storage containers and slide rule exposure calculators.

Write us concerning any problem of Gamma Ray Radiography

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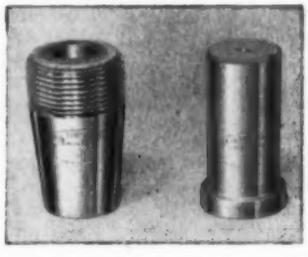
WHEREVER BLASTING IS DONE!



Wherever there is blast cleaning there ought to be a Federal Blast Nozzle. Made of cast tungsten-carbide (the hardest metal known to man) the Federal Blast Nozzle concentrates the blast, reduces air costs and outwears any nozzle previously offered for the purpose.

Being cast, the tungsten-carbide is pure—as is not the case when made by sintering.

The purity of the metal ensures long wear, reduces air consumption and guarantees concentration of the blast—all due to the extremely slow wear of the orifice.

Made in several sizes; adapters can be furnished to fit all makes of blasting equipment.

The Federal Foundry Supply Company
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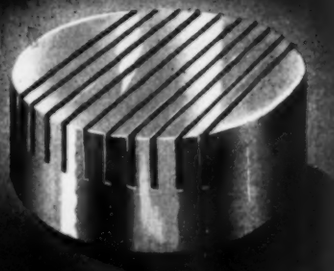
Precision



CORE BOX VENTS

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock!

BRASS SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

STEEL SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SCREEN TYPE CORE BOX VENTS
Mesh: #30, #40, #50.
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

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HARDLAC
PATTERN COATING
for Positive Protection

Made in Standard Colors as Recommended by AFA.

Prevent Warping, Swelling, Deterioration of Wood Patterns In Use or On the Shelf

Yes—*Hardlac* is the foundry tested, ready-to-use pattern coating that is daily eliminating costly losses on wood patterns for many of America's leading foundries and pattern shops.

That's because this special formula synthetic alcohol soluble varnish is specially developed for the job. Oils, water, waxes, kerosene and gasoline just can't penetrate it! Put it on and you're *protected* for sure!

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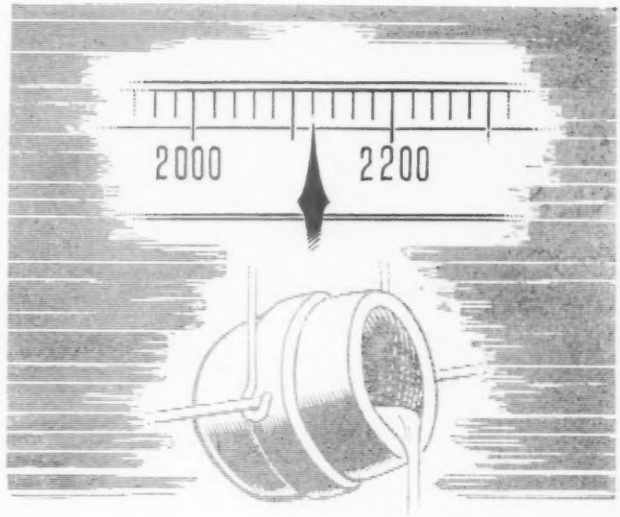

"2120 DEGREES!"

Whether your correct pouring temperatures are low or high, a clear, steady temperature reading is necessary to assure accuracy, prevent miss-runs and save precious time in the foundry.

With the Marshall Enclosed-Tip Thermocouple, the exact temperature is flashed from the *interior* of the melt, instead of from the cooler surface temperature.

Because the Marshall Thermocouple is sealed from all circuit interference, its readings are steady, definite and dependable. Use it in brass, copper, aluminum and magnesium.

Mail coupon below for interesting booklet, "How to Use the Marshall Enclosed-Tip Thermocouple".

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Yes, send the free instruction booklet, "How to Use the Marshall Enclosed-Tip Thermocouple", to aid us in taking more accurate molten metal temperatures.

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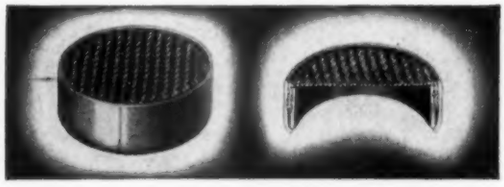
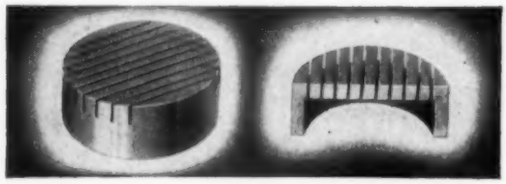
NO BLOWOUTS with RIENACKER CORE BOX VENTS



SCREEN TYPE—Patent No. 2,263,974

For HIGH-SPEED production. Made from 30 mesh monel screen lapped 3/16" over brass innertube and firmly secured with brass outertube, making a strong, fool-proof unit. Each vent is sized through a die assuring accurate fit. The compression between outer and inner tubes holds screen securely in place without slightest danger of blow-out. Costly work stoppages to repair or replace vents are eliminated.

Use Rienacker core vents (screen type) whenever possible—on all flat surfaces, and on curved surfaces wherever core marks are unimportant. You get fastest air escape with minimum liability of clogging.



SLOTTED TYPE—Patent No. 2,238,506

For CONCAVE and CONVEX RADII. Made of brass, precision slotted for greatest air escape possible with this type of vent. Standard slot width for cast iron .014; for brass .010. Core vent hole should be made with a step-drill so that bottom of vent rests on shoulder thus provided. This slotted vent is easily shaped to any curved surface; leaves no core marks on casting.

• • •

Write for information and prices on gas escape vent bushings for use with round or rectangular vent rods. Round bushings in all drill rod sizes; rectangular bushings: 3/32" x 1/4"; 3/32" x 3/8"; 1/8" x 1/4".

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SPECIAL HIGH SILICON GRADES

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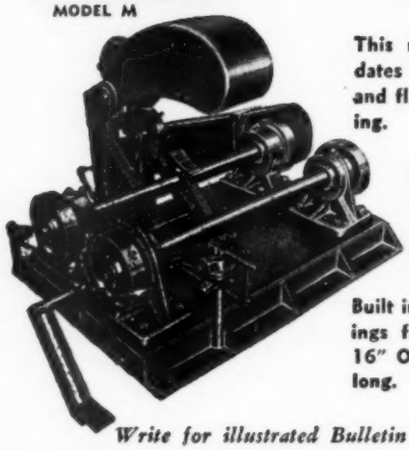
HORIZONTAL CENTRIFUGAL CASTING MACHINE

TO PRODUCE FERROUS and NON-FERROUS CASTINGS

MODEL M



This machine accommodates both metal molds and flasks for sand molding.

Continuously variable speed control using standard AC power.

Built in six sizes for castings from 1½" O.D. to 16" O.D. and up to 48" long.

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GUARANTEES CLEAN CASTINGS

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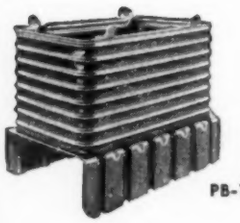
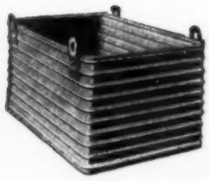


PB-120T



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● Simplicity of design... minimum of working parts... every Grimes Molding Machine incorporates these features. Add Grimes positive roll-over and long, accurate draw feature (up to 20") plus other special features ... result: consistently superior molds. All this means reduced maintenance and operating costs . . . mighty important savings whether small or large foundry. Many foundries *depend on Grimes* for all their molding machine needs. Why don't you? Write for complete data.

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Gasweld ... MOULD DRYING TORCH

Speeds Production!

Gasweld Torches are listed as standard by Underwriters' Laboratories.

Old-style, more cumbersome methods of mould drying are eliminated by the use of the "Gasweld" Torch—the last word in convenience and efficiency for the modern foundry. It's ideal for "skin" drying...A large, bushy flame covers a wide area and drives moisture from the hard-to-get-at corners of even the most complicated moulds. The "Gasweld" Torch is well-balanced and easy to handle—it weighs only 3½ pounds—and operates efficiently on natural, city or petroleum gases—using pressures as low as 4 ounces.

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Steel Abrasives

GUARANTEED ACCURATE SIZES

Graded to the new S. A. E. specifications

Performance will prove you are right in selecting "Sure Shot" and "Par Grit" abrasives for blast cleaning. They're unequalled because they're scientifically heat treated by a special process which makes each pellet hard, uniform and tough. They clean faster . . . last longer . . . and do the job better. Our modern screening system guarantees accurate sizes graded to the new S.A.E. specifications. Write today for free samples and price list.

IMMEDIATE DELIVERY — All quantities shipped in double 100-lb. bags, insuring safe delivery. 100-lb. bags, ton and carload lots available.

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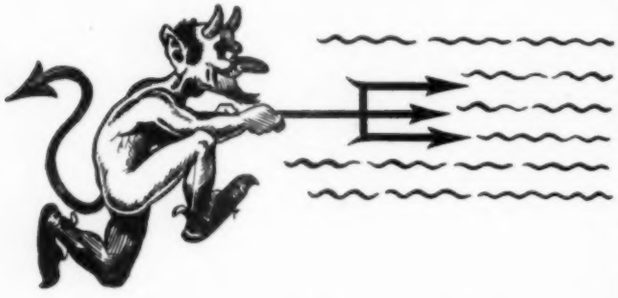
SOFFEL'S
THERMOTOMIC
METALS FEEDING COMPOUND
(PATENTS PENDING)

for Ferrous and Non-Ferrous Metals



KEEPS METAL MOLTEN

THERMOTOMIC is a new exothermic feeding compound which generates 35,000 B.T.U. per pound. Its use assures reduced size of feeding heads or risers, substantially lowered cleaning costs of castings, as well as a reduction in scrap losses. THERMOTOMIC is produced in powder form only. It can be molded into feeding ring cores or inserts of any desired shape by the same method as sand cores. No special equipment is required for its use. THERMOTOMIC raises the temperature of the metal where it is applied as feeding rings or inserts under the feeding heads permitting better feeding of the metal into the mold and retarding solidification in those portions of the castings where rapid cooling may cause piping, shrinkage or segregation. THERMOTOMIC can also be used as a facing application where it is desired to maintain fluidity of the casting metal. THERMOTOMIC is past the experimental stage in its many applications with scores of nationally known foundries using it regularly as standard practice in the production of ferrous and non-ferrous castings.

In order to obtain the maximum feeding of the metal from the feeding heads, we recommend that our No. 5 CARBON FREE LIQUIDIZER be used in conjunction with THERMOTOMIC to produce atmospheric feeding through the feeding heads because of the great importance of using a head compound that will keep the metal liquid sufficiently long for the THERMOTOMIC ring under the feeding head to feed the casting.

Both THERMOTOMIC and NO. 5 CARBON FREE LIQUIDIZER are packed in 100 lb. drums and in 500 lb. barrels with full instructions for their use enclosed.

Also fluxes for all metals alloys.

Write us for descriptive literature and full particulars

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BASIC, MALLEABLE FOUNDRY, FORGE AND LOW PHOSPHORUS
PIG IRON

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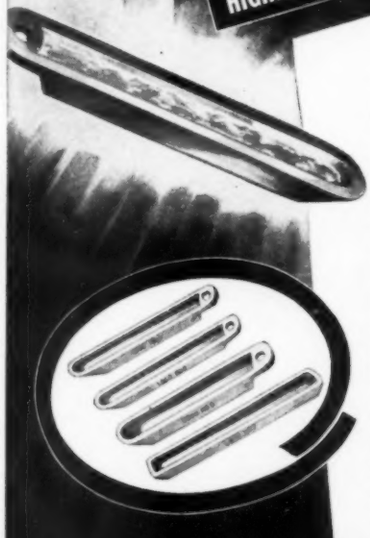
THE E. & G. BROOKE IRON COMPANY

BIRDSBORO, PENNSYLVANIA

Established 1788

The trend is toward

HIGHER COMBUSTION TEMPERATURES



LECO COMBUSTION BOATS

have been designed to withstand temperatures up to 2700° Fahrenheit.

In addition they give you these features:

- Fast preheating because of light weight.
- Resist heat shock to permit reuse of the boat for repeated combustions.
- Sulphur free.
- Carbon free, except as contaminated from handling.
- ***VERY LOW COST***

There is a Leco Combustion Boat to suit your every requirement. Large stocks of standard shapes and sizes are maintained to assure immediate delivery. Special shapes may be furnished upon request.

Compare the Leco boat with any other on the market. We will furnish you free samples for this purpose.

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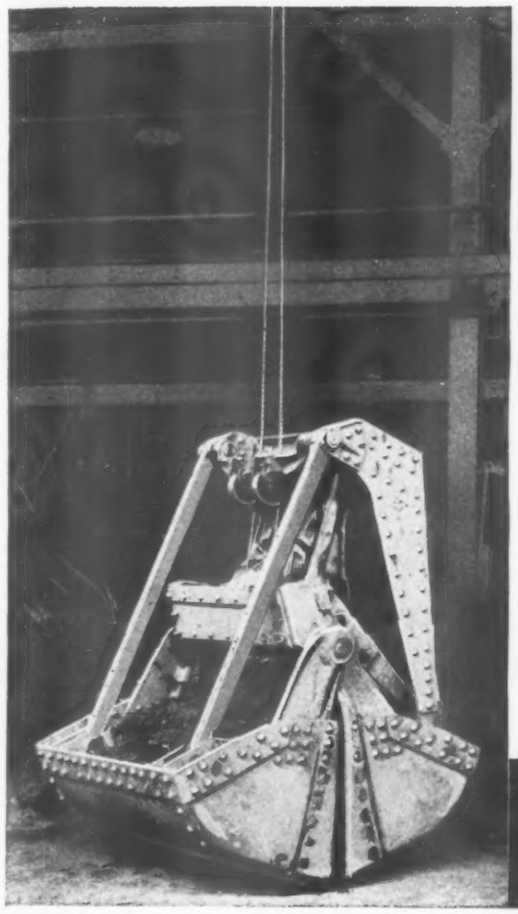

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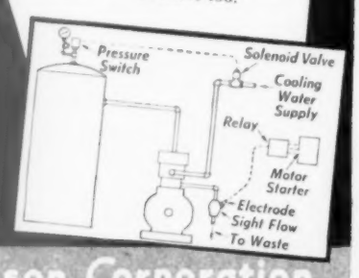

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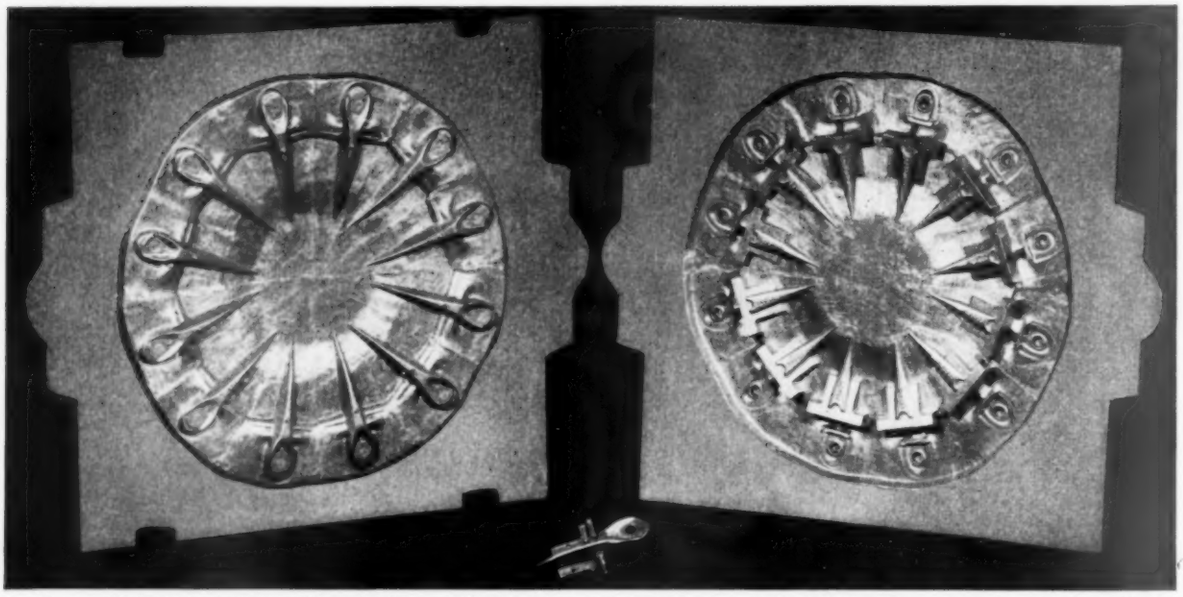

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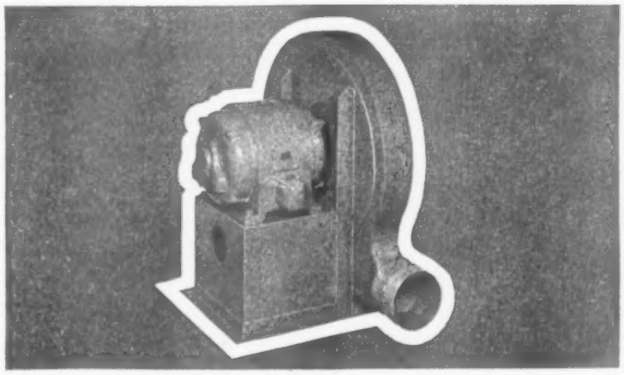

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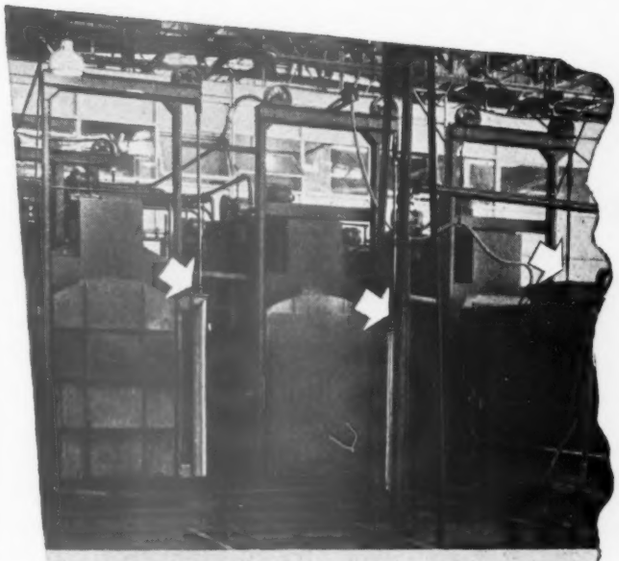

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NOTE TO READERS: If you will check the item or items described which particularly interest you, we will be glad to request the manufacturers concerned to send you their literature. Use the attached postal card

1. Fans

B. F. Sturtevant Co.—24-page illustrated catalog No. 430-3 gives uses, construction and sizes of exhaust fans designed for dust control, fume exhaust and collecting and conveying materials which can be carried on current of air. Performance tables give ratings for fans with wheel diameters from 25 to 60 inches and with capacities from 680 to 20,000 cubic feet per minute.

2. Oil Filters

Skinner Purifiers, Inc.—8-page illustrated handbook No. 623 shows application of oil filters in industrial, automotive, aircraft and marine fields. Complete explanation of each unit is included as well as designated use.

3. Foundry Equipment

Whiting Corp.—Illustrated bulletins FY-141 and FY-139 describe foundry ladles and cradle furnace respectively. 36-page booklet entitled "Useful Information for Foundrymen" is revised and enlarged edition of booklet containing practical data pertaining to various foundry operations.

4. Sand Blasting Machine

Sanstorm Mfg. Co.—4-page illustrated folder describes Sanstorm sand blasting machine for any type of hard or soft grit blasting. Available in both stationary and portable models, capacities of two sizes are 4 and 7 cubic feet.

5. Polishing Machine

Central Scientific Co.—4-page illustrated bulletin No. 65 describes Cenco-Hangosky Electropolisher for rapid polishing and etching of metallurgical specimens. Usable with ferrous and non-ferrous metals and alloys of many types, machine automatically controls polishing and etching times.

6. Respiratory Equipment

Pulmosan Safety Equipment Corp.—36-page illustrated catalog describes respirators, masks, helmets and hoods for protection in dusts, fumes, vapors, paint sprays, gases, acids, sandblasting, babbitting and other places. Care and use of equipment and general data are discussed.

7. Pneumatic Tools

Keller Tool Co.—60-page illustrated catalog No. 12 describes pneumatic equipment including drills, nut-setters, screwdrivers, grinders, chipping hammers, riveting hammers, compression riveters, air hoists, special air motors and accessories. Line includes fourteen new tools developed during the war.

8. Crane Buckets

Orton Crane & Shovel Co.—16-page illustrated catalog No. 75 is descriptive of five types of buckets for use with cranes. Capacities, weights and dimensions are listed. Also described are wood grapples for use in handling stacked material.

9. Corrosion Resistant Masonry

U. S. Stoneware Co.—51-page illustrated bulletin No. 810 presents information and suggestions on selection of materials and construction methods for tanks, towers, sumps, floors and other masonry construction. Properties of various corrosion resistant masonry materials are tabulated. Detailed information is given on each cement. Related engineering data are included in technical section.

10. Control Valves

C. B. Hunt & Son, Inc.—12-page illustrated bulletin No. 107 presents data on Quick-As-Wink control valves for air, water and oil. Models are available for foot, hand, diaphragm or solenoid operation. Accessories are also described.

11. Infrared Heating

Fostoria Pressed Steel Corp.—12-page illustrated booklet entitled "Infrared Parade" contains information on reconversion tips, reports on use and applications of infrared heating installations for baking, drying, dehydrating or preheating operations. Available engineering service is described.

12. Medical Supplies

Gebauer Chemical Co.—Three 4-page bulletins describe tannic spray treatment for burns, ethyl chloride U. S. P. anesthetic and phenyl-mercuric-chloride solution which is germicidal solution for application to wounds and lesions. All are available in special dispenser bottles. Tannic spray reduces probability of blister formation.

13. Bearing Alloys

Federated Metals Div., American Smelting & Refining Co.—36-page illustrated technical manual presents information of assistance to engineers and consumers of bearing alloys in design, construction and maintenance of friction-type bearings for all kinds of machinery.

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14. Steam-Detergent Cleaning

Oakite Products, Inc.—28-page illustrated booklet form 4543R2 covers steam-detergent cleaning with Oakite Solution-Lifting guns. Method removes grease, oil, dirt, sand and other deposits from all types of equipment.

15. Grinders

Fox Grinders, Inc.—16-page illustrated looseleaf type booklet describes swing frame grinders, stand grinders and special grinding equipment for foundries. Design and operating features are covered and specifications are given.

16. Safety Equipment

American Optical Co.—Series of seven illustrated catalog sheets gives information on industrial gloves, arm protectors, leather mittens and goggle cases. Separate price list gives prices for all of company's safety equipment.

17. Materials Handling

Lewis-Shepard Products Inc.—Illustrated folder shows lift trucks, stackers, power fork trucks, floor trucks and skid platforms for various types of industrial materials handling.

18. Heat Treating

Lindberg Engineering Co.—12-page illustrated bulletin No. 190 describes Hyco Hydryzing atmosphere process for heat treatment of tool and high speed steels. Hyen, Hyex and Hyam controlled atmosphere generators are described for handling various types of heat treating.

19. Instruments

Foxboro Co.—16-page illustrated catalog No. 370 presents details of full line of recording and indicating instruments for measurement and control. Instruments for temperature applications, pressure, humidity, flow liquid level, density and other process variables are included. Line of Dynalog electronic instruments is also covered.

20. Dust Collectors

Torit Mfg. Co.—24-page illustrated catalog No. 31 covers line of dust collectors which are self-contained units for carrying away dust laden air around grinding, cutting and polishing wheels. Numerous models are shown and technical data are included. Accessories are described.

21. Overhead Conveyors

Lamson Corp.—20-page illustrated catalog form No. 645 entitled "Utilize the Air Rights of Your Ceilings" presents overhead chain conveyors for manufacturing operations, traveling stockroom procedure, stockrooms and warehouses and in packing and shipping departments.

22. Die Casting Machines

Hydropress, Inc.—8-page illustrated bulletin presents data and information about Hydrocast model No. 3 die casting machine. This full hydraulic, self-contained, semiautomatic, electrically controlled unit employs cold chamber principle in production of die castings.

23. Mold Spray

Hercules Powder Co.—8-page folder form No. 400-301 presents data on Truline mold spray 91 for use in steel, iron and nonferrous foundries. Saving in time and improved casting quality are claimed for material's use. It is solvent-type mold spray for strengthening surfaces of green sand molds.

24. Pneumatic Tools

Independent Pneumatic Tool Co.—64-page illustrated catalog No. 52-B, second edition, includes data on drills, tappers, screwdrivers, nut setters, grinders, sanders, squeezers, busters, balancers, wrenches, rammers, saws, hoists and riveting, scaling and chipping hammers. Accessories are presented.

25. Molding Units

Fellows Corp.—4-page illustrated bulletin entitled "How to Produce 360 Snap Molds Per Hour" describes Fellows match plate molding unit and shows three typical standard handling systems to produce maximum production in minimum space.

26. Abrasive Products

Brightboy Industrial Div., Weldon Roberts Rubber Co.—12-page illustrated loose leaf catalog No. 57 presents line of burring, finishing and polishing abrasive products. Available in wheel, tablet, stick and special shapes, abrasive is imbedded in soft rubber binder which cushions abrasive.

27. Hand Tools

Precise Products Co.—20-page illustrated bulletin "Facts & Figures" covers power, speed and applications of Precise 35 portable electric hand tools for industrial use. Construction features and complete assembly information is given. Specifications of attachments are listed.

28. Refractories

Chicago Retort & Fire Brick Co.—39-page illustrated plastic-bound book covers manufacture, use and applications of refractory materials in foundries. Types for gray iron foundries, malleable iron foundries and ladles are presented. Refractory specialties are described.

29. Cranes

Orton Crane & Shovel Co.—16-page illustrated catalog No. 73 describes advantages, operation, construction features, dimensions and normal working capacities of One-Man Aero-Crane which is operated, traveled and steered from craneman's seat.

30. Dust Control

American Air Filter Co.—36-page illustrated bulletin No. 270-A discusses Roto-Clone system of dust control. Principle, advantages and applications for all foundry requirements are covered.

31. Pumps

Marco Co.—12-page illustrated catalog No. 25 points out twelve features of Flow-Master pumps for handling either light or heavy viscous materials. Engineering data, table of motor horsepower requirements for various pressures and capacities and price list are included.

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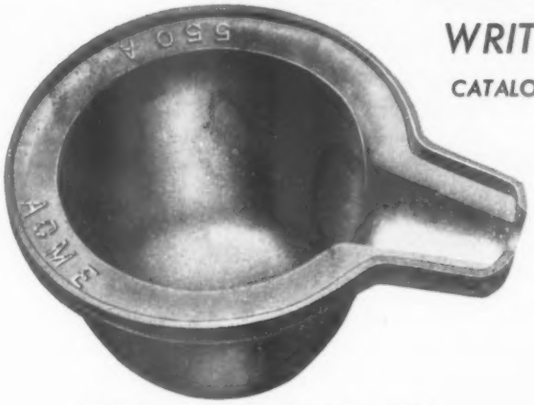

ROUND SPOUT POT NO. 550A
WITH 1¼" COLLAR ON FLANGE

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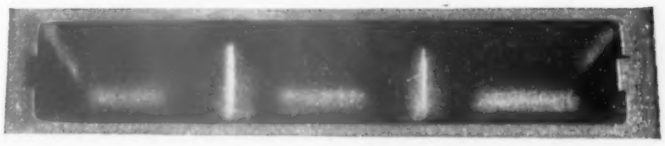

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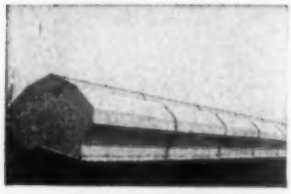

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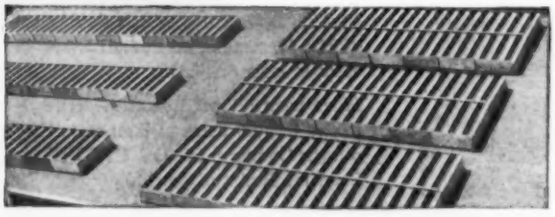

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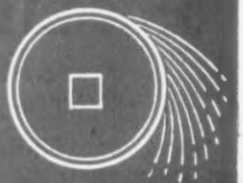

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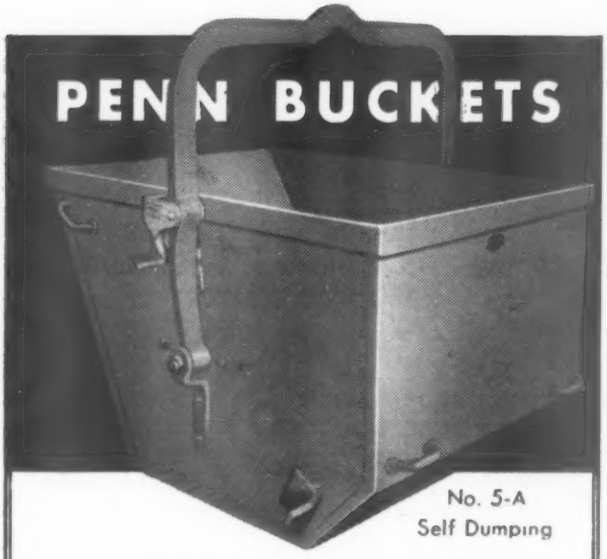

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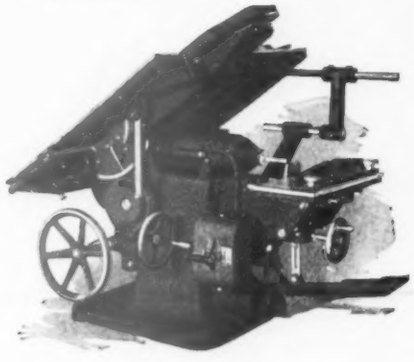

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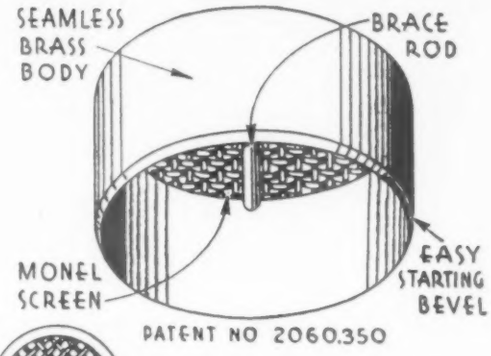

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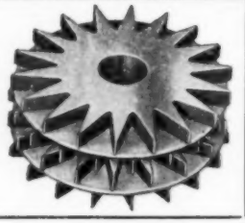

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This is a portable machine with three wheels, two in front, one in back, zerk fittings on all moving parts. Comes equipped with air gauge, pop-off gauge and a pin on top of the arm for a gate horn.

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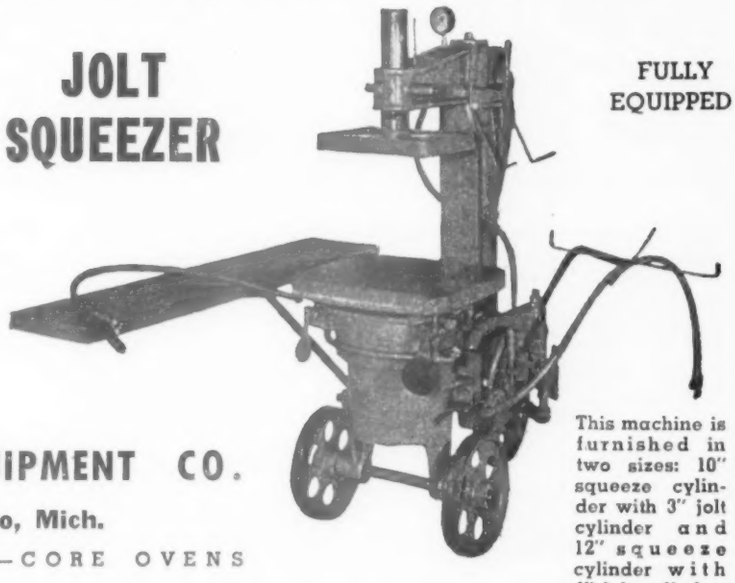

This machine is furnished in two sizes: 10" squeeze cylinder with 3" jolt cylinder and 12" squeeze cylinder with 4" jolt cylinder.

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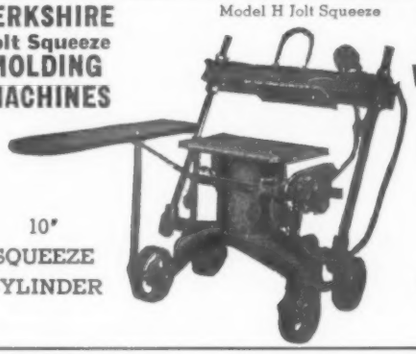

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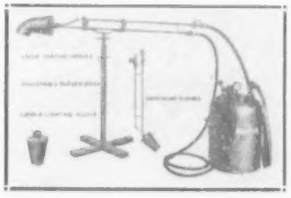

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Associated Engineers Inc., 230 E. Berry St., Fort Wayne 2, Ind.
Lester B. Knight & Associates, 120 So. LaSalle St., Chicago 3, Ill.

FOUNDRY NAILS
Capewell Mfg. Co., Hartford, Conn.
Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SHOVELS
(See SHOVELS)

FOUNDRY SUPPLY HOUSES
Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N Y.
Eastern Clay Products, Inc., Eifort, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, O.
Hoffman Foundry Supply Co., 1193 Main St., Cleveland, Ohio.
Midwest Foundry Supply Co., Edwardsville, Ill.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis St., Philadelphia 24, Pa.
Stevens, Inc., Frederic B., Detroit 26, Mich.

FURNACES (Aluminum & Magnesium Billets)
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.

FURNACES (Aluminum & Magnesium Forgings)
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Kirk-Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
W. S. Rockwell Co., 56 Church St., New York 17, N. Y.

FURNACES (Aluminum Melting)
Ajax Engineering Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

FURNACES (Aluminum Rivet Heating)
Ajax Electric Co., Inc., Philadelphia 23, Pa.
Despatch Oven Co., Minneapolis 14, Minn.

FURNACES (Annealing)
Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
Campbell-Hausfeld Co., Harrison, Ohio.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., 2448 West Hubbard, Chicago 12, Ill.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Crucible Melting)
Ajax Electrothermic Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Eclipse Fuel Engrg. Co., 711 So. Main St., Rockford, Ill.
Fen Machine Co., 1350 Babbitt Rd., Cleveland 17, Ohio.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Johnston Mfg. Co., Minneapolis 13, Minn.
Radiant Combustion Inc. Warren, Ohio.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.

FURNACES (Electric Melting)
Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Gas or Oil Fired)
Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Fen Machine Co., 1350 Babbitt Rd., Cleveland 17, Ohio.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., 2448 West Hubbard, Chicago 12, Ill.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
Radiant Combustion Inc., Warren, Ohio.

FURNACES (Gas or Oil Fired) (cont'd)

W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

FURNACES (Gray Iron Melting)

American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Heat Treating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., 2448 West Hubbard, Chicago 12, Ill.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
Maehler, Paul, Co., 2200 W. Lake St., Chicago 12, Ill.
Radiant Combustion Inc., Warren, Ohio.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.

FURNACES, HEAT TREATING (Electric)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Lindberg Engineering Co., 2448 West Hubbard, Chicago 12, Ill.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

FURNACES (Malleable Annealing)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
General Electric Co., Schenectady, N. Y.
Lindberg Engineering Co., 2448 West Hubbard, Chicago 12, Ill.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

FURNACES (Malleable Melting)

American Bridge Co., Pittsburgh 19, Pa.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Nonferrous Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.

FURNACES (Nonferrous Melting) (cont'd)

Fen Machine Co., 1350 Babbitt Rd., Cleveland 17, Ohio.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Powdered Coal)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Steel Melting)

Ajax Electrothermic Corp., Trenton, N. J.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACE BLOWERS

Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Roots-Connersville Blower Corp., Connersville, Ind.

FURNACE LININGS

Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp. Vars Bldg., Buffalo 2, N. Y.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Ironton Fire Brick Co., Ironton, O.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Nock Firebrick Co., 1243 East 55th St., Cleveland 14, Ohio.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.
United States Graphite Co., Saginaw, Mich.

GAGES

Acme Aluminum Alloys Co. Inc., 232 N. Findlay St., Dayton 3, O.

GAGGERS

Federal Foundry Supply Co., 4600 E. 71st., Cleveland 5, O.

GAS

American Gas Association, 420 Lexington Ave., New York 17, N. Y.

GAS (Oxygen, Acetylene, Industrial)

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

GAS BURNERS

Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

GLOVES (Industrial, Safety)

American Optical Co., Southbridge, Mass.

GLUE POTS (Electric)

Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.

GOGGLES and EYE PROTECTORS

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.

GOGGLES and EYE PROTECTORS (cont'd)

Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.
Willson Products Inc., Reading, Pa.

GRAPHITE

Asbury Graphite Mills, Asbury, N. J.
Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17.
United States Graphite Co., Saginaw, Mich.

GRINDERS (Electric Portable)

Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Standard Electrical Tool Co., 2488 River Rd., Cincinnati 4, O.
U. S. Electrical Tool Co., Cincinnati 4, O.

GRINDERS (Flexible Shaft)

Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
N. A. Strand Co., 5001 N. Wolcott Ave., Chicago 40, Ill.

GRINDERS (Pneumatic Portable)

Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17.
Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland 5, Ohio
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Keller Tool Co., Grand Haven, Mich.

GRINDERS (Surface, Bench, Disc, Floor)

Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis.
Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.
Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
Standard Electrical Tool Co., 2488 River Rd., Cincinnati 4, O.
N. A. Strand Co., 5001 N. Wolcott Ave., Chicago 40, Ill.
U. S. Electrical Tool Co., Cincinnati 4, O.
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind.

GRINDERS (Swing Frame)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind.

GRINDING WHEELS—See ABRASIVE WHEELS

GRINDING WHEEL DRESSERS

Carborundum Co., Niagara Falls, N. Y.
Desmond-Stephan Mfg. Co., Urbana, O.

GRINDSTONES

Bay State Abrasive Products Co., Westboro, Mass.
Sterling Grinding Wheel Div. Cleveland Quarries Co.,

GRIT (Abrasive)

Alloy Metal Abrasive Co., Ann Arbor, Mich.
American Steel Abrasives Co., Galion, O.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Carborundum Co., Niagara Falls, N. Y.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio
Globe Steel Abrasive Co., Mansfield, O.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.

GRIT (Abrasive) (cont'd)

National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
Western Metal Abrasive Co., 2545 East 79th St., Cleveland 4, O.

GYPSUM CEMENT

United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

HAMMERS (Chipping)

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17.
Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland 5, Ohio
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Keller Tool Company, Grand Haven, Mich.
Schramm Inc., West Chester, Pa.

HARDNESS TESTING EQUIPMENT

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

HEAT CONTROL AND RECORDING DEVICES

Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Lindberg Engineering Co., 2448 West Hubbard, Chicago 12, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.

HEATERS (Direct Fired)

Despatch Oven Co., Minneapolis 14, Minn.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.

HEATERS (Gas, Oil, Electric)

American Foundry Equipment Co., Mishawaka, Ind.
Despatch Oven Co., Minneapolis 14, Minn.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.

HEATERS (High Frequency Electric)

Ajax Electrothermic Corp., Trenton, N. J.

HEATERS (Indirect Fired)

Despatch Oven Co., Minneapolis 14, Minn.

HEATERS (Liquid, Steam)

Johnson Corporation, Three Rivers, Mich.

HEATERS (Space, Unit, Oven, Water)

American Foundry Equipment Co. 505 S. Byrkit St., Mishawaka, Ind.
Maehler, Paul Co., 2200 W. Lake St., Chicago 12, Ill.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.

HELMETS (Blasting)

American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
American Optical Co., Southbridge, Mass.
Mine Safety Appliance Co., Braddock, Thomas & Meade Sts., Pittsburgh 8, Pa.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O

HELMETS (Welding)

American Optical Co., Southbridge, Mass.

HOISTS (Air)

Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.

HOISTS (Air) (cont'd)
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Keller Tool Company, Grand Haven, Mich.

HOISTS (Chain)
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Wright Mfg. Div., American Chain & Cable Co., York, Pa.

HOISTS (Electric)
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.
Wright Mfg. Div., American Chain & Cable Co., York, Pa.

HOISTS (Hand)
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Clipper Mfg. Co., 4030 Manchester, St. Louis, Mo.

HOSE (Air, Blasting, Water, Gas)
Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland 5, Ohio.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pangborn Corp., Hagerstown, Md.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Schramm Inc., West Chester, Pa.

HYDRAULIC CLEANING EQUIPMENT
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
N. Ransohoff, Inc., 208 W. 71st St., Cincinnati 16, O.

ILLUMINATORS (X-Ray Film)
Eastman Kodak Co., Rochester, N. Y.

IMPREGNATING SYSTEMS
Empire Varnish Co., 2636 E. 76th St., Cleveland 4, O.
Kerkling & Co., Burbank, Calif.

INGOT MOLDS
Acme Foundry Co., Detroit 16, Mich.

INGOTS (Magnesium)
Dow Chemical Co., Midland, Mich.

INGOTS (Nonferrous)
Ajax Metal Co., Philadelphia 23, Pa.
Aluminum Company of America, Pittsburgh, Pa.
Aluminum & Magnesium Inc., Sandusky, O.
American Smelting & Refining Co., 120 Broadway, New York 5.
Apex Smelting Co., Chicago, Ill.
Cleveland Electro Metals Co., W. 38th St. & NP RR. Cleveland 13, O.
Federated Metals Div., American Smelting & Ref. Co., New York 5.
General Smelting Co., Philadelphia, Pa.
International Nickel Co., Inc., 67 Wall St., New York City 5.
Jobbins, Wm. F., Inc., Aurora, Ill
Lavin & Sons R., Inc., Chicago, Ill.
National Smelting Co., Cleveland, O.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, New York.
Silverstein & Pinsof, Inc., 1720 N. Elston, Chicago 22, Ill.
Sonken-Galamba Corp., Kansas City, Kan.

INGOTS (Nonferrous) (cont'd)
U. S. Metals Refining Co., New York.
U. S. Reduction Co., E. Chicago, Ind.
Western Metal Co., 3201 S. Kedzie Ave., Chicago 26, Ill.

INSPECTION (Cast Metals)
Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

INSPECTION (Fluorescent Penetrant)
Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

INSPECTION (Magnetic Particle)
Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

INSULATORS (for casting heads)
Houghton Co., E. F., Philadelphia, Pa.

IRON CEMENT
Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

IRON ORE
Bethlehem Steel Co., Bethlehem, Pa
Pickands, Mather & Co., Cleveland 14, O.

IRON OXIDES
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.

JACKETS (Mold)
Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

LABORATORY EQUIPMENT (Chemical)
Buehler, Ltd., 228 N. LaSalle St., Chicago 1, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Laboratory Equipment Corp., Benton Harbor, Mich.

LABORATORY EQUIPMENT (Physical)
Buehler, Ltd., 228 N. LaSalle St., Chicago 1, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Laboratory Equipment Corp., Benton Harbor, Mich.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Norton Co., Worcester 6, Mass.

LADLES
Bethlehem Steel Co., Bethlehem, Pa
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Industrial Equipment Co., Minster, O.
Modern Equipment Co., Port Washington, Wis.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE HEATERS
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE LININGS
Ironton Fire Brick Co., Ironton, Ohio.
Nock Firebrick Co., 1243 East 55th St., Cleveland 14, Ohio.

LATHE CENTERS
Chicago Mfg. & Distributing Co 1928 W. 46th St., Chicago 9, Ill

LEAD
American Smelting & Refining Co., 120 Broadway, New York 5.

LIMESTONE
Bethlehem Steel Co., Bethlehem, Pa.

LINSEED OIL
Hercules Powder Co., 999 Market St., Wilmington 99, Del.

LOADERS
Clearfield Machine Co., Clearfield, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

LUBRICANTS (Industrial)
Houghton Co., E. F., Philadelphia, Pa.
United States Graphite Co., Saginaw, Mich.

LUMBER (All kinds)
Dougherty Lumber Co., 4300 East 68th St., Cleveland 5, O.

MACHINE KEYS
Standard Horse Nail Corp., New Brighton, Pa.

MAGNESIUM (Ingots)
Apex Smelting Co., 2534 Filmore St., Chicago 12, Ill.
Dow Chemical Co., Midland, Mich.

MAGNET CONTROLLERS
Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.

MAGNETS
Dings Magnetic Separator Co., 512 E. Smith St., Milwaukee 7, Wis.
Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

MANGANESE (Briquets)
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

MATCHPLATES
Acme Aluminum Alloys Inc., 232 N. Findlay St., Dayton 3, O.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3, O
Newark Pattern and Machine Co., Newark, O.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

MECHANICAL ENGINEERS
Wyzenbeek & Staff Inc., 838 W. Hubbard St., Chicago, Ill.

MELTING POTS
Acme Foundry Co., Detroit 16, Mich.

METAL CASTING PLASTER
United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

METAL CLEANING EQUIPMENT
American Foundry Equipment Co., Mishawaka, Ind.
N. Ransohoff, Inc., 208 W. 71st St., Cincinnati 16, O.

METALLOGRAPHIC EQUIPMENT
Buehler Ltd., 228 N. LaSalle St., Chicago 1, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

METALLURGISTS
Associated Engineers Inc., 230 E. Berry St., Fort Wayne 2, Ind.
Chas. C. Kawin Co., 431 S. Dearborn St., Chicago 5, Ill.
W. G. Reichert Engineering Co., 1060 Broad St., Newark, N. J.

METERS (Gas, Air, Water)
Illinois Testing Laboratories, Inc 420 N. LaSalle St., Chicago 10, Ill
Roots-Connersville Blower Corp., Connersville, Ind.

MICROSCOPES
Buehler, Ltd., 228 N. LaSalle, Chicago 1, Ill.

MIXERS (Core Wash)
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

MIXERS (Sand and Clay)
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington St., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Co., Waterloo, Iowa.
Freeman Supply Co., 1152 Broadway Toledo 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

MOLD CONVEYORS
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Roto-Cast Foundry Equipment Inc., 100 Grand St., Coldwater, Mich.

MOLD DRYERS
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.

MOLD OVENS and DRYERS
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., Cleveland 13, O.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Maehler, Paul, Co., 2200 W. Lake St., Chicago 12, Ill.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.
Young Bros. Co., 6508 Mack Ave., Detroit 7, Mich.

MOLD TRUCKS (Power Operated)
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

MOLDING MACHINES
Adams Co., Dubuque, Iowa.
Arcade Manufacturing Div. Rockwell Mfg. Co., Freeport, Ill.
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SAWS (Masonry)

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Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
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American Steel Abrasives Co., Galion, O.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
Steel Shot & Grit Co., Inc., 39 Warren Ave., Boston, Mass.
Western Metal Abrasive Co., 2545 E. 79th St., Cleveland 4, O.

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We are interested in securing the services of a good, reliable man for the sale of metals and alloys, principally to the major steel companies, but will only consider a man of experience and good record. Address: Box 636, Niagara Falls, New York.

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First Class foundry superintendent for a foundry employing 300 men producing gray iron castings. Located in New Jersey. Write giving full particulars as to age, experience, reference, etc., to Box 699, The FOUNDRY, Cleveland 13, Ohio.

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Seventeen years in different phases of chemistry. Analytical background with working knowledge of physical chemistry and metallography. Grey iron and nonferrous alloys. Analytical experience with many of newer procedures, particularly trace constituents. Desire connection with progressive organization having adequate facilities and recognizes careful accurate work. Address: Box 782, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Thoroughly qualified practical grey iron foundryman with successful record as plant manager. Have nineteen and a half years' experience in production work plus three years of foundry engineering. Desire to make connection with an organization who would appreciate one who is a go-getter and can operate a plant on a well organized and solid basis. Forty-two years of age and now employed. Address: Box 636, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY SUPERINTENDENT

A practical trained foundryman well versed in all phases of production and jobbing work in bronze, aluminum and nickel covering such lines as valves, railroad, automobile, bushings and shipbuilding is seeking a change. Thirty years' experience, married, steady and reliable. Will go anywhere. Available on short notice. Address: Box 738, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Practical, thoroughly experienced technically trained foundryman. Well versed in the production of heavy and light castings in green and dry sand, continuous pouring and cupola practice for the production of high tensile alloy iron. Married and available on short notice. Address: Box 778, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

Diversified experience in gray iron and steel. Outstanding record of accomplishment trouble shooting on production. Skilled in foundry layout, plant design and mechanization. Well versed on scientific melting and mixing. Address: Box 571, The FOUNDRY, Cleveland 13, Ohio.

TIME STUDY ENGINEER

Familiar with all phases of malleable foundry practice. In present position in charge of time study division of well known malleable foundry for eight years. Best references available as to ability including present employer. Prefer East or Mid-west location. Address: Box 777, The FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER
MATURE, CAPABLE, DEPENDABLE

With a record that assures you that he can manage your business energetically and safely and develop its possibilities fully and profitably. Excellent experience foundry, machinery and allied lines. General management established medium-size business primary objective. Correspondence in confidence. Address: Box 598, The FOUNDRY, Cleveland 13, Ohio.

SALES EXECUTIVE

TWENTY YEARS' EXPERIENCE SELLING FERROUS AND NONFERROUS CASTINGS. COMPLETE KNOWLEDGE OF ALLOYS AND THEIR APPLICATION. SPECIALIZE IN HEAVY INDUSTRY AND CORROSION-RESISTANCE FIELD. AVAILABLE IN SIXTY DAYS. ADDRESS: BOX 762, THE FOUNDRY, CLEVELAND 13, OHIO.

Positions Wanted

SALES METALLURGIST

46 with background in cast specialties—iron and steel, desires affiliation with company where foundry experience and metallurgical knowledge count. Address: Box 748, The FOUNDRY, Cleveland 13, Ohio.

SALES DIVISION

Twenty-five years' experience in ferrous and nonferrous industries. Intimate knowledge, supervisory capacity, operation, engineering and sales. Carnegie Tech graduate. Desires connection in Sales with foundry or sales representative organization. Age 48. References. Address: Box 760, The FOUNDRY, Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN

Twenty-five years' experience in charge of production and jobbing foundries making light and heavy high grade machinery jobbing casting. Well versed in modern production foundry methods, cupola practice in handling men, rigging and sand control. Address: Box 758, The FOUNDRY, Cleveland 13, Ohio.

ALUMINUM FOUNDRY SUPERVISOR

Thirty years' experience in all phases of foundry production; age 46. Seeks opening in Detroit area; available immediately. Address: Box 773, The FOUNDRY, Cleveland 13, Ohio.

SALESMAN

70 years young. Plenty health, vim and vigor. Fifteen years in sand—25 years' selling. Specialty-binders. Who wants me. Address: Box 648, The FOUNDRY, Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN

With twenty years as assistant foundry superintendent on electrical steel, open hearth steel, gray iron and semi-steel. Know floor, pit and machine molding for production. At present assistant foundry superintendent. Age 56. Married. References if desired. Address: Box 642, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Wide experience in all departments. 25 years' superintendent. Practical and technical training, high grade medium and heavy jobbing and production, gray iron and semi-steel castings, green and dry sand. Best of cupola practice. Address: Box 550, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY AND INDUSTRIAL ENGINEER

Available on consulting basis or short term contract to aid small founders establish, revise and maintain job evaluation, wage incentive, foundry methods, plant layout. Fifteen years' experience in grey iron, malleable and steel. Address: Box 719, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

M.S. Metallurgical Engineer, at present manager of Eastern steel foundry, wants responsible position with progressive company. Has unusually fine record, good labor relations. Address: Box 747, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Broad foundry and management experience capable of directing operations efficiently and profitably. A practical executive with qualified record for maintaining good customer and personnel relations and working out foundry problems promptly and effectively. Address: Box 668, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERVISOR

THOROUGH KNOWLEDGE OF ALUMINUM AND MAGNESIUM, MODERN PRODUCTION METHODS, TIME STUDY, INDUSTRIAL RELATIONS. REFERENCES EXCHANGED. WRITE: W. C. A., 105 BAMFORD AVE., HAWTHORNE, N. J.

GRAY IRON METALLURGIST

Cupola expert. Experienced in production of high tensile and alloy irons. Thoroughly familiar with sand and foundry quality control including design of gating systems. Preferred location—West Coast. Address: Box 795, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

PATTERNMAKER

Capable of taking over shop, estimate cost and layout work to produce accurate sound castings. General pattern shop experience both wood and metal patterns and driers and core blowing. Ability to handle men and train apprentice. First class mechanic and can qualify as working foreman in small shop or supervise large shop. Address: Box 779, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY METALLURGIST

Desire responsible position in development and research or production control preferably in connection with gray iron foundry. Ten years' experience metallurgical control steel foundry, quality control, heat treatment and application of castings and wrought steels to automotive parts. Seven years' gray iron research. Author of technical papers. Age 41, M.S. in metallurgy. Address: Box 797, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT (BRASS-GRAY IRON)

Am interested in connection with jobbing or small production foundry employing 12-15 molders where my 30 years' experience in brass and iron are needed. Middle West. Address: Box 688, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRY FOREMAN

Practical experience on all work. Jobbing and production. Address: Box 792, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Technically trained—34—jobbing foundry experience. Metallurgist, assistant superintendent. Know good melting, molding, gating for production of sound castings. Desire Midwest location. Address: Box 793, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS
SALES MANAGER OR PLANT EXECUTIVE

Eight years' nonferrous experience sales and manufacturing. Fifteen years' industrial experience. 57 years old, married, honest, dependable, excellent references. Address: Box 784, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

With 20 years' experience as molder in gray iron and nonferrous foundries desires position as foreman on light production or jobbing or soil pipe and fittings. Western or central New York state preferred. Address: Box 785, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Age 47, practical foundryman, molder by trade, technical graduate with broad experience in general jobbing and production. Well versed in modern mechanized foundries and methods. Desires to make connection with firm located in New England. Address: Box 788, The FOUNDRY, Cleveland 13, Ohio.

Open Capacity

CAPACITY AVAILABLE

Foundry grey iron capacity available up to 50 lbs. castings. Also pattern capacity.

CHEMUNG MACHINE MFG. CO.
ELMIRA, N. Y.

OPEN CAPACITY

Foundry has open capacity. The production of 8 squeezer floors and 2 floors of floor molding. Reasonable lots or running jobs preferred. Address: Buckler Foundry Co., P. O. Box 149, East Alton, Illinois.

Foundries For Sale

FOR SALE

Old established grey iron foundry in the "Garden Spot" county of America. Production primarily farm equipment. Opportunity for considerable expansion, especially for custom work.

JOHN B. KENDIG, JR.
502 WEST KING ST., LANCASTER, PA.

Classified Advertising

Foundries For Sale

FOUNDRY FOR SALE

North Central Pennsylvania. Employes 25 men, gross about $150,000 a year. Sale price depending upon inventory estimated at $20,000. Address: Box 767, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE OR LEASE

Brass and aluminum foundry located in central Ohio. Shown by appointment only. Address: Box 769, The FOUNDRY, Cleveland 13, Ohio.

Capacity Wanted

WANTED

Foundry to make small gray iron castings. Can give contract for 350 to 500 ton first year. Pattern plates furnished. Address: C. G. S., P. O. Box 31, Oconto, Wis.

GRAY IRON FOUNDRY CAPACITY WANTED

4 to 10 Squeezers. Casting weights 8 to 10 lbs. each. No cores. Match plates, one pattern. Snap flask 13" x 13". Continuous production. Cupola iron. Analysis, silicon 1.90-2.20. Phosphorus .25. Manganese .55-.70. Total carbon 3.30-3.55. Combined carbon .55-.70. If unable to handle that one, then here is another account. Casting weights from 15 lbs. to 250 lbs. each. No cores. Very chunky. Same analysis as above. Loose patterns furnished, you mount for squeezer or roll-over or jolt machines. Quantities limited per order to 100 to 500 pcs. on light weights and 10 pcs. to 100 pcs. on 50 lbs. each, and heavier. Can use 200 Tons monthly. Tumble barrel or wheelabrator finishes. Okay on all above. Delivery point: Chicago. Suggest quick action.

BOX 757
THE FOUNDRY CLEVELAND 13, OHIO

Correspondence Course

THE CUPOLA IS THE HEART OF THE FOUNDRY

Turn the searchlight of McLain's System on your cupola. 90c of every dollar is spent before melting begins—but some make it look like 30c by indifferent melting. Are you using the maximum percentage of steel scrap in your castings? If not, why not? The value of the scrap pile lies in the fact it offers you food for thought. Our system is worth the fee as a desk reference Synopsis free.

McLAIN'S SYSTEM INC.
236 E. NORTH AVE., MILWAUKEE 12, WIS.

Wanted-To-Buy

WANTED

One Wheelabrator, size 36" x 42" with or without loading device. Address: Box 759, The FOUNDRY, Cleveland 13, Ohio.

WANTED TO BUY

Complete or part of foundry mechanization for 30 squeeze molders on continuous pouring desired, to approximate following specifications:

1 Overhead sand belt conveyor, 125 feet centers, 24 inches wide.
2 Thirty (30) molders sand hoppers.
3 Sliding chain driven mold conveyor for average 12" x 18" x 7" molds with alternate on overhead chain conveyor. Total length 650 feet.
4 Two (2) light duty 3" x 8" shakeouts for 220-3-60 current.
5 Ventilating and cooling hoods.

BOX 768
THE FOUNDRY CLEVELAND 13, OHIO

Wanted-To-Buy

FOUNDRY NAILS
Any Quantity

4 x 8—or any size close. Can substitute roofing nails.

GLAZER STEEL CORPORATION
610 CHAMBERLAIN ST. PHONE 3-0738
KNOXVILLE, TENN.

WANTED

500 to 1000 pound electric melting furnace. State size of furnace, transformer capacity and price in first letter. Address: Box 765, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Used die casting machine suitable for brass and aluminum. Send particulars to: Box 771, The FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Used Sand Cutter 51" Model AA or 50" Model M, American or similar type. Address: Jaeger Machine Co., Columbus 16, Ohio. Atten.: Purchasing Agent.

WANTED

Jolt rockover pattern draw machine similar to the Osborn 443 machine stationary or portable. Address: Box 796, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Small Grey Iron Foundry to rent or lease with option to buy in State of Wisconsin. Address: Box 787, The FOUNDRY, Cleveland 13, Ohio.

Opportunities

EXPORT REPRESENTATION

American mfr. of quality steel cleaning and peening shot and grit wants foreign trade. Big stocks. Ask for literature and samples. Advise lines now selling, territory covering.

BOX 617
The FOUNDRY CLEVELAND 13, OHIO

OPPORTUNITY

We can furnish empty tight and slack wooden barrels also steel drums for your products. ADDRESS: BUCKEYE COOPERAGE STATION, C.P.O. BOX 1501, CLEVELAND, OHIO.

IRON FOUNDRY—EASTERN LOCATION

Practical foundry engineer, successful operator will set up and put iron foundry in operation. Address: Box 776, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Foundry to make grey iron castings. Patterns mounted for roll-over equipment, six patterns in all. Will need approximately 40 tons per month Castings must be machinable, average weight—100 lbs.

THE PECK, STOW & WILCOX CO.
SOUTHINGTON, CONN.

For Sale

FOR SALE

Royer portable sand cleaner and blender with built in induction motor, Westinghouse safety switch, cord and plug—price $400.00.

W. N. RUSSELL & CO.
34 ALBERTSON AVE.
WESTMONT, N. J.

Employment Service

SALARIED POSITIONS
$2,500-$25,000

This thoroughly organized confidential service of 36 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 Dun Bldg. Buffalo 2, N. Y.

For Sale

FOR SALE

20 Ton Capacity Jolt Molding Machine Manufactured by Herman Pneumatic Machine Co. This machine was purchased by us from the Herman Pneumatic Machine Co. as a thoroughly rebuilt machine in 1939. It cost $4,800.00 The table top is 7 ft. x 10 ft. The jarring capacity is at 80 lbs.; gage pressure is 45,000 pounds.

Before we really got to using the machine our work changed so that it has had practically no service since we have owned it. Nevertheless we will remachine the table top and test the machine out before shipment to a purchaser although it is in excellent condition—right now. We have foundation drawings.

Price about $2,000.000 F.O.B. Cleveland, Ohio

FULTON FOUNDRY & MACHINE CO., INC.
EAST 75TH ST. & MORGAN AVE.
CLEVELAND 4, OHIO

FOR SALE

Gisholt Turret 3¼" Capacity 18" Swing. Quick return. Very good complete. J and L Turret Saddle type, 3" x 36". Very good complete.
Higley No. 9 undercut cold saw. 21", 9" cap. Complete good condition.

Tumbling Mills. W. W. Sly 60" x 36" x 36". Exhaust type. Inside hardened.

1 48" Sly Mill 28" square. Exhaust type. Inside hardened.

1 cast iron octagon Mill 56" x 24". Ball bearings. Heat treating furnaces. American Rotary Gas furnace. Size 2-B. Carbonizing or Hardening. Oil & Water bath. L & W Controls.

Am. Industrial G. E. Annealing or Hardening Electric Furnace. 1850 Deg Box Type. 30" x 60" x 22". 3 Ph. 60 Cy. 220 Vts. 60 KW.

JAY SALTER
306 ROSEDALE ST.
ROCHESTER 7, N. Y.

FOR SALE

1—Ransohoff Water Mill 36 x 60 side loading and end loading. Automatic star separation and star return. Complete with direct drive and in good condition.

1—Plain jolt machine 20 x 30 table.

1—Cylindrical-covered ladle (geared) 29" x 28½" (Modern) 1500 lbs. capacity.

1—405 Osborn Jolt Roll-over pattern draw; jolt cylinder 12" dia. Pattern draw 18" max. flask limit 64".

1—46" dia. x 56" inside length tumbling barrels.

2—30" dia. x 42" inside length tumbling barrels.

BOX 635
The FOUNDRY CLEVELAND 13, OHIO

FOR SALE

MOLDING MACHINE No. 602 Osborn Jolt Roll-over Pattern Draw Machine available at once. For further details call or write: ALLIED INDUSTRIAL SALES CO., 8430 GRAND RIVER, DETROIT 4, MICH.

Classified Advertising

For Sale

OVERHEAD CRANES

1-Ton
Whiting 33′ Span
Curtis 24′ Span
1½-Ton
Shepard Niles 25′6″ Span
P & H 34′ Span
2-Ton
Louden 19′2″ Span
Box 36′9″ Span
Detroit 28′ Span
3-Ton
Shaw 33′ Span
P & H 25′ Span
Northern 22′ Span
Manning, Maxwell & Moore 48′¾″
"Conco" 48′ and 26′6″ Spans
5-Ton
Whiting 47′4″ Span
38′10½″ Span D.C.
Northern 30′9″ Span
Milwaukee 70′ Span
Milwaukee 66′9″ Span
Manning, Maxwell & Moore 70′ Span
Manning, Maxwell & Moore 47′4″ Span
Shaw 36′ Span
Champion 37′6″ Span
American 70′ Span
American 47′4″ Span
6-Ton
P & H 77′ Span
American 77′ Span
7½-Ton
Shepard 36′ Span
10-Ton
Shaw 68′ Span
Shaw 73′ Span
P & H 30′ Span
P & H 87′6″ Span
P & H 80′ Span
Northern 71′10½″ Span
Northern 60′ Span
Morgan 55′6″ Span
Morgan 39′5″ Span
Morgan 52′3″ Span
Milwaukee 66′9″ Span
McGill 85′ Span
Lane 50′ Span
Emsco 75′ Span
Dominion 35′ Span
Cleveland 38′1½″ Span
Cleveland 50′ Span
Alliance 71′10½″ Span
Alliance 58′9″ Span
Albany 60′ Span
15-Ton
Whiting 71′10½″ Span
Northern 53′ Span
Erie 60′ Span
Chesapeake 55′6″ Span
Case 51′ Span
20-Ton
Shepard Niles 49′6″ Span
P & H 51′4″ Span
Northern 60′ Span
Morgan 60′ Span
Cleveland 65′ Span
25-Ton
Whiting 106′ Span
Tysaman 60′ Span
P & H 70′ Span
Morgan 52′3″ Span
Cleveland 106′ Span
Case 63′ Span
Bedford 50′ Span
30-Ton
Whiting 80′ Span
P & H 80′ Span
P & H 60′ Span
Morgan 30′ Span
Case 41′ Span
35-Ton
Bedford 50′ Span
Northern 22′ Span
50-Ton
Shaw 95′ Span
Shaw 69′10″ Span
Dominion 80′ Span
Cleveland 71′10½″ Span
75-Ton
Morgan 59′2½″ Span
Alliance 78′ Span
Alliance 37′ Span
80-Ton
American 40′6″ Span
125-Ton
Morgan 100′ Span
150-Ton
Whiting 30′ Span
175-Ton
Morgan 54′ Span
200-Ton
Alliance 100′ Span

Telephone us collect to discuss your requirements.

ECONOMY CO., INC.
49 VANDERBILT AVENUE, NEW YORK 17, N. Y.
Telephones: MUrrayhill 4-2294, 4-2893, 4-2295, 4-2844, 4-2296, 4-8292

REBUILT EQUIPMENT FOR SALE

1—Curtis Air Compressor with tank.
1—Worthington Air Compressor.
1—Ingersoll Rand Air Compressor.
12—Units Lockers (96 doors) 8 doors to unit.
14—Steel Cabinets and Lockers.
1—Lot Conveyors complete with stands and Curves.
1—Electro Lift.
1—Water Tumbler.
1—No. 50 Large Exhaust Fan.
20—Skids.
1—Battery Lift Truck, table 40″ long, 30″ wide, 10″ from floor, lift 3″.
5—Tabor 22″ Shockless Jar Power Rollover, Power Draw Machine with rollover plate 22″ x 42″, Pattern Draw 10″, capacity at 80 lbs. pressure 600 lbs. complete with air operated flask clamps.
1—30″ Shockless Jar Power Rollover, Power Draw Molding machine with 30″ x 40″ rollover plate, 12″ pattern draw, capacity 80 lbs. pressure, air operated flask clamps.
2—Jeffrey Sand Conditioners.

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA ST.
KALAMAZOO, MICH.

MOLDING MACHINE FOR SALE

1 like new Osborn No. 2047-4 air jolt power turnover and pattern draw molding machine, equipped with air clamps, air lock, special air control draw and hydraulically operated power rollover mechanism. Size 21¾ x 22″; pattern draw 9″; flask height adjustable from 10″ to 11½″. Specially adapted for aluminum work. Address: HANSELL-ELCOCK COMPANY, 485 WEST 23rd PLACE, CHICAGO 16, ILLINOIS.

FOR SALE

2 brass furnaces, 2 rattlers, 2 metal stacks. Address: Box 794, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

1 Campbell Hausfeld 1200 lb. Gear Tilting (Metal melting furnace). Address: Box 783, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

10—Osborn Jolt-Squeeze-Rollover Machines, Serial Number 10200, Portable Type, 1941 model, cost new $1700.00; now $650.00 each.
1—Royer Shakeout Machine, motor and starter attached, table size 30″ x 60, only used for two months, $750.00.
20—Ten foot lengths of conveyors with stands; excellent condition, $3.40 per foot.
All prices F.O.B. East Bridgewater, Mass.

OLD COLONY FOUNDRY COMPANY
EAST BRIDGEWATER, MASS.

ONE (1) Three-Phase Tilting Type Wile Electric Arc Furnace, 500 lb. capacity, complete with 400 KVA Power Transformer, G. E. Control Panel, Oil Circuit Breaker, and accessories.

ONE (1) American "Wheelabrator" Tumblast, 27″ x 36″, complete with #65A Dustube Collector, #11 Clarage Exhauster, Blast Gates, and all electrical motors and wiring for 220/440 volt. Also many new replacement parts.

MR. F. R. WHEELER, METROLOY COMPANY,
NEW ROCHELLE, NEW YORK
FOrdham 7-8890, New Rochelle 2-2200

FOR SALE
FLASKS

Cast Steel—
50 set 16½ x 25 x 9 x 9
20 set 13½ x 24 x 6 x 6
15 set 15 x 44 x 5 x 7
Shanafelt type—
30 set 24″ dia. x 6 x 9
50 set 15 x 18 x 7 x 7
1 International Rollover Type GR Size 24 x 12

BARDES FORGE & FOUNDRY CO.
CINCINNATI 14, OHIO

FOR SALE

Tabor Cut-off machine with 16″ wheel
Used 1 month—like new
7½ HP, 22-Volt, AC Motor
Will demonstrate

also

One 15 HP Western Electric induction motor complete with starter box
220 Volt, AC 3 Phase, 60 Cycle, 860 RPM

BERLENBACH FOUNDRY CO.
SHELLY, PA.

FOR SALE

One #3 1/2 Whiting Cupola, Serial 5251. Excellent condition.

AMERICAN ABRASIVE METALS CO.
460 COIT ST. IRVINGTON, N. J.

CENTRIFUGAL COMPRESSORS AND BLOWERS

(1) 5000 cfm @2# Spencer CC with 75 HP 3/60/1750 RPM motor.
(2) 1250 cfm @1# Buffalo 7x7 Brass & Bronze Blower with 10 HP 3600 RPM motor.
(3) 1200 cfm Buffalo, 9½ x 7 x 7¼ with 7½ HP, 220/3/60 1750 motor.
(4) 800 cfm @1½# American Sirroco blower with 10 HP 3/60/3600 RPM motor.
(5) 600 cfm @3# Spencer turb. blower with 10 HP, 1700 RPM motor.
(6) 225-400 cfm @1# Sturtevant CC with 3 HP 3/60/3600 RPM motor.
(7) 20¼ x 16¼ x 18¾ Allington and Curtis No. 55 (belt drive).
(8) 10½ x 10½ American size 5 (belt drive).
(9) (2) 8 x 8 Sturtevant size 21061-9 (belt drive).

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND 14, OHIO

FOR SALE

2,000 FT. GRAVITY ROLLER CONVEYOR 18″ WIDE, COMPLETE WITH STANDS AND CURVES, PRACTICALLY NEW.

1—Clark Dual Tractor—3 Wheel—2 cylinder Gasoline Engine.

1—Elwell-Parker Electric Tin Plate Fork Truck, can be used for Furnace Charger.

2—Clark "Clarkat" Tructractors, 1940-1941 Models.

INDUSTRIAL TRADING CO.
1225-31 WEST MONROE STREET
CHICAGO 7, ILLINOIS

FOR SALE

1—Demmler core blower style #2.
1—Champion core roll-over with air jolt table size 12″ x 14″.
1—Champion core roll-over with air jolt table size 16″ x 15″.
1—Air Van Power Ventilator, roof type, Baldor Elect. Motor, 2 h.p., 1140 r.p.m., 220-440 volts, 3 pha., 60 cy.
We have a number of Hines and Fremont aluminum slip flasks and cast iron jackets of various sizes in good condition. For details write and specify your sizes.

CHICAGO FOUNDRY COMPANY
2028 N. MAJOR AVE.
CHICAGO 39, ILLINOIS

FOR SALE

We offer, subject to prior sale, 4 Thermo Exhausters, Type PS 25, class L, fitted with V belt drive and 3 H.P. Westinghouse motors, 3 phase, 220-440 V., 60 Cycle.

We offer, subject to prior sale, 8 Thermo Exhausters, type M.I.H. 50, class H, fitted with V belt drive and 30 H.P. Westinghouse motors, 220-440, 3 phase, 60 cycle.

These units are practically new, very little used, purchased in 1943.

The units are manufactured by the Industrial Gas Engineering Company of Chicago, Ill.

CONDENSER
SERVICE & ENGINEERING CO., INC.
93 RIVER ST.
HOBOKEN, N. J.

TEMPERING FURNACE
LARGE SIZE
LINDBERG FOR SALE

Type 487260-EH Vertical Cyclone complete with AA Automatic Lindberg Control. This double-purpose furnace (air or salt bath) is ideal for the treatment of aluminum and magnesium. Used equipment for immediate delivery. Dept. 205 E.

DALMO VICTOR CO.
SAN CARLOS CALIFORNIA

Classified Advertising

For Sale

OVERHEAD ELECTRIC TRAVELING CRANES

(1)—10-ton Toledo, 3-motor, 230-VDC., 51'6" span, cage operated.
(1)—15-ton Shaw, 106'8" span, 230-VDC., CG. OP., 36'0" lift, (THIS IS AN EXCELLENT HIGH LIFT CRANE FOR OUTSIDE SERVICE).
(1)—3-ton Chesapeake Gantry, 3-motors, CG. or FL. OP., 220/440-VAC., 18'11" bet. legs, 5'6" overhang each end.
(1)—7½-ton, 2-motor, CG. OP. Shepard Monorail Hoist, 230-VDC., 40'0" lift (A GOOD HOIST FOR CUPOLA CHARGING SERVICE).

MONORAIL ELECTRIC HOISTS

	Tons	Make	Current	Remarks
(1)	½	LO-Hed	220-VAC.	FL. OP.
(3)	½	Shepard	230-VDC.	2-motors
(4)	½	Shepard	230-VDC.	FL. OP.
(1)	2	Shepard	230-VDC.	FL. OP.

SPECIAL:
(1)—No. 2 Simpson Mixer, high side with bucket loading equipment, extra muller tires.

MOTOR GENERATOR SETS
(1)—Factory-built 220-KW, 250/275-VDC. Allis-Chalmers on C.I. base, 288-HP., Syn. motor, 1200-RPM., 440/3/60-cy., with complete A.C. and D.C. panels and starting equipment.

(SEND FOR OUR STOCK LIST OF STANDARD A.C. AND D.C. MOTORS, CRANE AND MILL TYPE, CONTROL EQUIPMENT, ELECTRIC BRAKES, ETC.)
WE OWN AND HAVE ALL THIS EQUIPMENT IN STOCK. IT IS OFFERED REBUILT IN OUR LARGE, MODERN PLANT AND FULLY GUARANTEED.

T. B. MACCABE CO.
4304 CLARISSA ST.
PHILADELPHIA (40) PA.

FOR SALE

36 large oblong steel flasks
14 round steel flasks
8 steel jackets
1 #16 Paxon cupola
Write for details.

CALORIC GAS STOVE WORKS
WIDENER BLDG.
PHILADELPHIA 7, PA.

FOR SALE

Soil Pipe and Fitting Equipment.
Available immediately.

We are discontinuing the manufacture of Soil Pipe and Fittings and converting our foundry to another line of castings.

We have a complete line of equipment necessary to produce Soil Pipe and Fittings from 2" to 12" diameters. Equipment consists of:

Pipe Molding Machines
Pipe Flasks and Arbors
Pipe Core Machines and Knives
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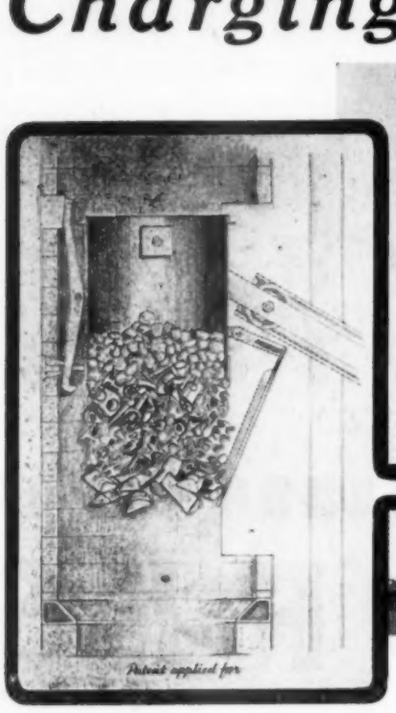

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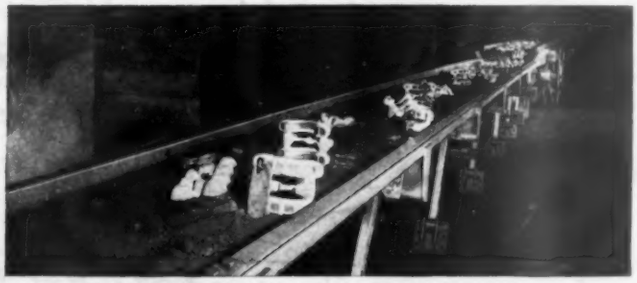

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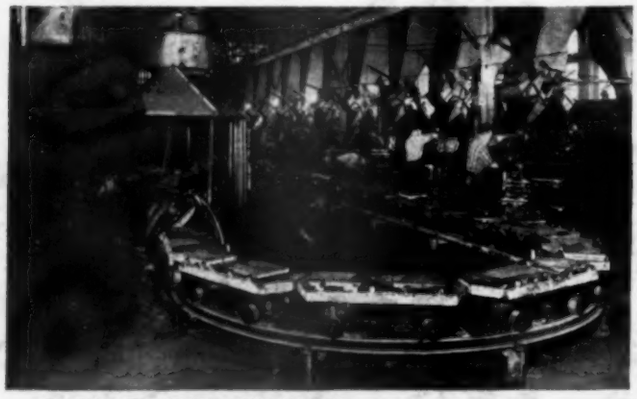
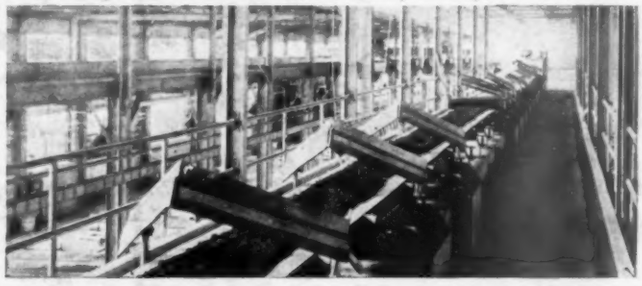
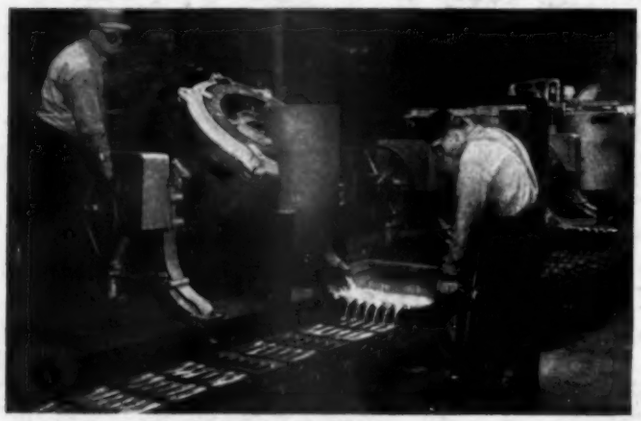


AUTOMATIC MOLD DISCHARGE. The Link-Belt Tru-Trac car type mold conveyor is designed for handling both large and small snap flask molds and to operate in irregular paths — up and down inclines. It has heavy cast-iron car tops, is fully equipped with anti-friction bearings and is low in both maintenance and H.P. requirements. The unit illustrated above, automatically discharges the molds.



SAND. Link-Belt distributing belt conveyors with single or double adjustable discharge scraper plows, deliver prepared sand to any number of molding stations in proper quantities. Molder's hoppers, gates and chutes are adaptable to different types of molding machines, and building clearances. Link-Belt anti-friction belt conveyors, including both flat and troughing types, are for every service in the foundry, including specially treated belts for hot shakeout sand.



POURING ON INGOT CONVEYOR. Hand lifting and carrying of ladles is eliminated by this Link-Belt conveyor which carries the molds through the pouring and cooling operations and discharges the ingots over head end of conveyor. Made in various designs and capacities to produce practically any size ingot.

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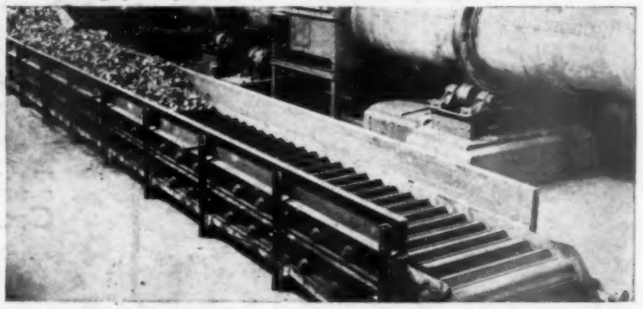

APRON CONVEYORS. Years of trouble-free service under the rigors of high temperatures and abrasive action have proved the durability and efficiency of Link-Belt apron conveyors for handling castings and sand. "No-leak" type apron conveyors prevent leakage of sand by means of an apron designed and built especially for foundry service. Made in various sizes and pitches to suit individual conditions.

THE SYMBOL OF QUALITY LB LINK-BELT

LINK-BELT CONVEYORS

AND PREPARATION MACHINERY

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT